



The Horseless age

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...THE... Horseless Age

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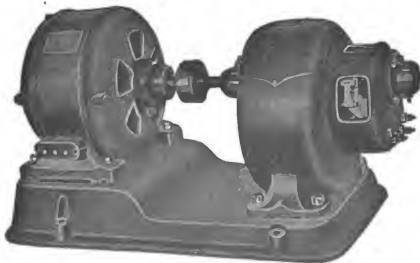
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...EVERY WEDNESDAY...

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Contest Conditions.

The technical committee of the National Association of Automobile Manufacturers has at present under consideration the rules for the reliability run to Pittsburgh next fall, and a report on these rules will be made in a few days at the regular monthly meeting of the association. It has already been announced that awards will be based upon a system of marking in a series of competitions bringing out all the desirable qualities of a car, such as regularity of running, hill climbing capacity, comfort, fuel economy, etc. The most interesting features still to be decided are the number of marks allowed for each characteristic and the measures that will be adopted to prevent the endurance run from degenerating into a race.

The question of endurance contest regulations has also been occupying foreign automobile organizations recently, and it may be of some interest to briefly review here the chief features of the contests of this kind that have been held abroad this season. The system of marking in the reliability contest to be held in England in September has already been described in these columns. It takes account of practically every factor that has any influence on the value of a car, viz., reliability, cleaning, hill climbing ability, condition, brakes, steering, silence, vibration, speed, freedom from dust, starting on hill, absence of smoke, appearance (finish), appearance after trials, cleanliness, accuracy of horse power, relative fuel consumption and cheapness. The total possible marks are 10,625, and the maximum for reliability only 3,000. The performance in the reliability run is therefore not at all decisive in regard to awards.

In connection with this trial, which is organized by the Automobile Club of Great Britain and Ireland, it is stated that its object is to produce a standard type of

car, and the conditions have consequently been so framed as to develop the features which are particularly valuable, such as silence, absence of vibration, cleanliness of motor and gear, etc.

In France a 500 mile endurance contest was held last week in connection with the Aix-les-Bains festivities. In this contest the vehicles were classed according to price, instead of by weight. The rules were undoubtedly formulated somewhat hurriedly, as the "concours de tourisme" was only a substitute for the races provided in the original program and which were prohibited by the Government after the Paris-Bordeaux disaster.

In this contest marks were awarded as follows: Reliability, 300; speed on hill, 200; fuel economy, 200; water economy, 100; average speed, 100. Total, 900 marks. Each stop was penalized 10 marks and in addition two marks for every minute it lasted. In the hill climbing contest every vehicle making an average speed of 18.5 miles up the hill received the full number of marks; those who did not attain this speed had ten points deducted for every kilometre per hour their speed fell short of it.

The fuel economy was reduced to the horse power developed at the rims, as determined from the hill tests, and the average speed marks were calculated similarly to the marks for hill climbing speed—that is, vehicles making an average speed of 18.5 miles for the whole distance received the full number of marks; others had ten points deducted for every kilometre per hour their average speed was below this standard.

There is one essential difference between the English and French contests here referred to: In the former the awards are based upon performance and also upon qualities that can only be judged and are matters of opinion, while in the latter only performance counts. The American con-

test will in this respect undoubtedly more resemble the English event.

There is a general tendency toward complication in the conditions upon which awards are made in endurance or reliability contests, and the public—which has been charged with being incapable of comprehending a contest in which the first arrival is not the winner—will more than ever need to exercise its thinking faculties to correctly appreciate the value of the awards.

Constitutionality of License Suspension to Be Tested.

As reported in *THE HORSELESS AGE* some weeks ago, the city authorities of Chicago recently temporarily suspended the automobile driver's license of A. C. Banker, of that city, for violation of the municipal speed ordinance. Banker, who was threatened with arrest if he should appear upon the streets with an automobile, applied for an injunction to restrain the city from carrying out its threat, and received first a temporary and then a permanent injunction. This last injunction was granted on the ground that the city has no authority under the State laws to issue licenses, and that the Chicago ordinance is therefore unconstitutional; and the injunction will remain in effect until the city shall prove the constitutionality of its ordinance.

There has been considerable speculation as to the possible effect of this court action upon the laws in Eastern States which provide for the withdrawal of license after repeated violations. On the one hand, it is held that all these laws requiring numbering, licensing, etc., are unconstitutional, owing to the fact that no such requirements are made of horse vehicles, and these laws therefore constitute class legislation. On the other hand, it is asserted that the withdrawal of licenses is unconstitutional for the reason that it may deprive a person of his means of gaining a livelihood. It is to be noted that the action of the Chicago judge in issuing the injunction does not affirm either of these assertions, but is based on the contention that the city of Chicago has no rights under the laws of the State of Illinois to require automobilists to take out licenses. Consequently, whether the Chicago authorities prove or fail to prove their case it will be impossible to draw any conclusions from this case as to the constitutionality of the license suspension provision in the laws of Eastern States.

The license suspension provision was championed by the club element; at one time, for instance, the idea was put forth that instead of arresting offenders of the speed laws their vehicles should be confiscated for a certain period, which would be just as effective though less humiliating punishment. In this connection it is to be observed that such punishment would be relatively harder on persons in the trade, professional chauffeurs, etc., than on amateur users. Suspension of license or similar punishment can, therefore, hardly be approved of except in extreme cases where the offender by systematic disregard of the law has proved himself a public nuisance. There is certainly no *a priori* reason why suspension of licenses in such cases should be unconstitutional, for the same conditions obtain as in the case of saloon keepers, who are often refused renewal of licenses if they conduct their establishments to the detriment of the community.

Cleanliness of Mechanism

When all the essential wearing parts of a car are enclosed in "dust-proof" cases it would seem to matter little how the dust and mud adhere to the outside of the cases. Yet there are a number of reasons why even the outside of the cases should be protected against dust and splashing mud, and several cars are now made with a special sheet metal protector below the engine and change gear, extending from side to side of the frame. There are always some shafts projecting from bearings in the casings, and precautions to avoid dust working into these bearings cannot possibly be too strongly urged. Besides, there are the connections for controlling the engine, change gear and brakes, which are not enclosed, and the joints of these can only be properly lubricated and protected against excessive wear if kept free from dust. Finally, any work around the engine and gear is much less onerous if these parts are clean.

When the engine is placed in front of the car it keeps much cleaner if a "honey-comb" radiator and fan are used than when the front of the bonnet is closed. In the former case a strong current of air is constantly drawn over the whole engine, which prevents any dust from settling on it, while in the latter case the eddies produced by the motion of the car tend to cause the dust to rise into the bonnet and adhere to the engine. The engine may therefore be considered to either attract

dust or repel it, according to the design of its housing. The fact that automobile engines are exposed to the dust of the road largely affects their life and reliability of operation, and means of protection against the dust is therefore a very important problem of design.

Lemoine versus Elliott Steering Pivots.

There appears to be a tendency in this country of late to discard the forked steering pivots, patented by Sterling Elliott, for pivots comprising an upright hollow standard at the end of the axle, which were probably first introduced by the Lemoine firm in France. The forked pivots were at one time also used in Europe, but have been entirely discarded there, owing to their lack of adjusting means. It is something of a conundrum why the forked pivots should have been adhered to so tenaciously here, particularly as they are subject to patent rights, and the only plausible explanation seems to be that the various drop forging concerns have the dies for the parts of these pivots and can therefore furnish such parts cheaper than others for which new dies would have to be made. Automobile manufacturers are, however, coming to the realization that the possibility of adjustment for wear in these parts is an essential in modern cars, with their relatively longer life than those of a few years ago, and are bringing pressure to bear on the drop forging concerns to turn out this type of pivot. Undoubtedly these pivots will be regularly obtainable in the market next season. Besides means of adjustment, the Lemoine pivots possess the advantage of permitting better lubrication and protection from dust.

The Growth of Touring.

To judge by the many inquiries we are receiving for suitable touring routes, particularly from readers in the Middle West, the coming season will mark a great advance in automobile touring in this country. Unfortunately the weather has been very unfavorable of late, but once the skies clear the highways will be reemerging with the chug-chug of the touring car. Most of the inquiries received are for routes in the Eastern States, as these States are on the whole most attractive to automobile tourists. The roads average better than in other parts of the country; there is a wealth of beautiful scenery, particularly in New

England, and many places famous in the political history of the country or through incidents in the lives of its great literary lights are located here. Another factor which favors touring in this section is that repair facilities are generally good; that nearly every city of any importance has at least one automobile storage station, and that fuel supply depots are also plentiful.

Calendar of Automobile Dates and Events.

- June 30—July 1, 2, 3.—Automobile and Motor Cycle Exhibition of the Minneapolis Riding and Driving Club, Minneapolis, Minn.
 July 1—15.—Irish Fortnight.
 July 2.—Gordon Bennett Cup Race.
 July 3, 4 and 5.—Endurance Run of the New York Motor Cycle Club to Boston and return.
 July 4.—Race Meets at Elvira and Columbus, Ohio.
 July 4.—Automobile Race Meets of the Automobile Club of Syracuse, N. Y.
 July 11.—Pittsburg Speed Trials.
 July 13—19.—Ostend Automobile Week.
 July 24.—Quarterly 100 Miles Trial of A. C. C. B. I.
 August 10—22.—Tourist Motor Bicycle Reliability Trials.

A steam carriage salesman is credited with the assertion that the condensing system on his car was so perfect that during a fog the water tank would constantly flow over, not only all the exhaust steam but also some of the fog being condensed.

TOURING IN AMERICA.

II.—The Berkshires.

By C. H. GILLETTE.

In all America, with its great variety of natural beauty, its lofty mountains and its broad plains, its seacoasts, its lakes and its rivers, there is no more ideal touring ground for automobilists than that section in Western Massachusetts known as the Berkshires. There are mountains of greater grandeur and valleys of greater beauty and lovelier lakes and rivers, but nowhere can be found a section that better combines the beauties of nature with those facilities which make touring enjoyable—accessibility, good roads, splendid hotels and supply conveniences.

The Berkshire Mountains are a continuation of the beautiful Green Mountain range of Vermont. Running across the western end of Massachusetts they continue on into Connecticut, falling away into foothills toward Long Island Sound. The winding Housatonic River, starting in the heart of the range, flows south through the very centre of the mountains, dropping lower and lower by falls and rapids to the Sound. The mountains rising on either side of this beautiful river slope away to the Hudson on the west and the Connecticut on the east.

A comfortable two days' run from New

York or Boston brings one into the midst of this section, and from Albany it is but a few hours' ride. It is, therefore, easily and directly accessible from east, south and west.

From Boston there are two routes, one by way of Worcester and Springfield and another via Fitchburg and Greenfield. The latter route, however, comprises grades of the heaviest sort from Greenfield on to North Adams, as it leads up over the Hoosac Mountain, through which the famous tunnel is cut.

A delightful trip from Boston to the Berkshires may be made by combining the upper with the lower route. By following the upper route as far as Greenfield and turning south there through the Connecticut Valley to Springfield and following the lower route to Pittsfield the bad grades from Greenfield to North Adams are avoided.

This route from Greenfield to Springfield takes in some of the most historic sections of New England, and it is well worth the tourists' while to make this run from Greenfield. The road is almost due south along the railroad through Greenfield and South Deerfield, a distance of 8 miles, almost all of which is level macadam road. At South Deerfield is the scene of the historic Indian massacre. Tourists will find good accommodations at the Bloody Brook Hotel, which takes its name from the brook made famous by the tragedy referred to above.

From here to Whately, only 2 miles, the road follows the trolley line, and from



VIEW ON ELM STREET (LOOKING SOUTH), NORTHAMPTON.



WACONAH FALLS, DALTON.



BALANCE ROCK, PITTSFIELD.



ONOTA LAKE, PITTSFIELD.

there to North Hatfield, 2 miles, and Hatfield, 3 miles beyond, the road follows the railroad very closely. From here to Northampton, a distance of 4 miles, the road follows along the canal and river. The entire road from South Deerfield is macadamized and is practically level, making an ideal run.

BOSTON TO THE BERKSHIRES.

For tourists from Boston, Northampton will be a good overnight stopping point. Greenfield is 92 miles from Boston by way of Fitchburg and from Greenfield to Northampton is 19 miles over level macadam road. The Norwood Hotel in Northampton makes a special point of catering to automobile tourists, having in connection with its accommodations a well equipped garage for the care of automobiles. There is also a

very good automobile station in the town under the charge of H. H. Holcomb, where necessary supplies and repairs may be obtained.

NORTHAMPTON, styled the Meadow City, is one of the finest old towns in New England, having been settled in 1654. It will celebrate its 250th anniversary next year, and a committee has already been appointed by the city government to improve this opportunity. It is noted for its many gifts and endow-

ments of educational institutions. Williston College is at East Hampton, only 4 miles distant, and Amherst, 8 miles east, is well worth a short visit.

From here the route to Springfield over practically level macadam road passes the foot of Mount Tom, from the summit of which the country for miles around may be comprehensively viewed. The dome of the Capitol in Hartford is plainly visible, and along the valley of Connecticut the towns of Springfield, Westfield, Hadley and Amherst may be plainly seen. The route to Mount Tom is through Smith's Ferry and practically direct to Holyoke, 9½ miles from Northampton. From here the road follows the trolley along the river to Springfield, a distance of 9 miles over good country road. This route through the Connecticut Valley is one of the most interesting in all of New England, and to the student of colonial history offers special attractions in the old towns of Deerfield and Hatfield. The scenery is delightful all along the route, and for an automobile the road is good throughout and the grades are comparatively level.

From Springfield to Pittsfield, a distance of 53 miles, although not the best of touring routes, is comparatively easy. The route is through Westfield, Huntington, Chester and Dalton. The road as far as Huntington is good macadam, and from there on is a fair country road. The scenery on this route is just as attractive as in any part of the Berkshires, and it is well worth while to make the trip slowly and appreciate the beauties of the river and valley and of the mountain and meadow.

If Lee or Lenox be the objective point a turn to the left away from the river at Chester, following the road through Fort Becket and past Green Water Pond through East Lee, will bring one onto the State road through Lee and Lenox. The State road through East Lee will probably be continued through Chester and Huntington this year.

NEW YORK TO THE BERKSHIRES.

From New York to the Berkshires there are two very good routes. The first and most popular is along the Hudson to Poughkeepsie, an easy day's run of 76 miles, and from there northeast through Millbrook, Amenia and Sharon to Lakeville, Conn. From here the route is north along the river and through Great Barrington, Lee, Stockbridge and Lenox to Pittsfield. A variation of this route is along the Hudson River to Hudson and from there east to Great Barrington. A second route from New York is along the Sound to Norwalk. From here a very good road follows the valley of the Housatonic through Danbury, New Milford, Kent and Falls Village to Great Barrington.

Nearly everyone who has traveled from New York to the Berkshires has followed the route along the Hudson River to

Poughkeepsie, and comparatively few know that there is another available route.

The road from New York to Norwalk along the Sound is well known, and tourists who desire to get away from the beaten thoroughfares can turn north at Norwalk and follow the railroad and river passing through South Wilton and Branchville to Danbury. This road, although dirt for most of the way, is in good condition and the grades are easy.

From Danbury the route is out White street to the end of the trolley, and a turn to the left will bring one to Beavers Brook, a distance of 1 mile. Another turn here under the railroad bridge, then a turn to the right past Brookfield Junction brings one to the river, along which the road follows closely to New Milford. This town, 38 miles from the Sound, is in the foothills of the Berkshires, and from here on the road follows the river closely, crossing here and there from one side to the other, but always between the hills rising on either side. From the natural location the route is practically without heavy grades, and although an ordinary dirt road it is perfectly suitable for automobile use in good weather. Such grades as are encountered are very easy. The hills will almost invariably be found to consist of short pitches, then a level stretch on which the engine can pick up nicely; then another short pitch, and so on, making a very much easier climb than a long, easy grade.

There are many beautiful spots along this route, and as it is an intensely rural country with comparatively little in the way of manufacturing or industry, other than farming, the tourist in search of "nature undefiled" will find satisfaction in passing through the villages which, while offering every hospitality, are not disfigured by unsightly factories.

Running directions along this route are almost unnecessary.

From New Milford to Gaylordsville the road follows the west bank of the river closely for 7 miles. After crossing the river here it follows the east bank for 6 miles to Kent. It crosses again here, and continues along the west bank to Cornwall Bridge, 11 miles, and through West Cornwall and Lime Rock to Falls Village. From here on the road is direct through Sheffield, Mass., to Great Barrington.

Tourists from the west coming east across New York State to Albany can continue on and reach Pittsfield in a very short time, the distance from Albany being only 39 miles. Or, they can go south along the river to Hudson and from there to Great Barrington. Or, again, they can go north to Troy and from there to North Adams, then south to Pittsfield.

There are such a variety of ways of getting into the Berkshires and getting away again that it lends peculiar charm to laying out a route and following it which is not found where a beaten thoroughfare must be followed. Once there and making one of those beautiful old towns—Pittsfield, Lenox, Lee, Stockbridge, Great Bar-

rington—the starting point for daily trips a week or more may be spent going out one way and returning another, seeing always new country and new points of interest, traveling always on magnificent roads and meeting always good hotels and stations.

There is such a bewildering variety of these short runs that it is impossible to describe them all, and one will suffice to show the general character of nearly all.

THE CAPITAL OF THE BERKSHIRES.

Suppose, for convenience, you are in

will pass the group of peaks composed of Lenox Mountain, Mount Osceola and Yokun's Seat. They are to your left as you climb toward South Mountain, over the side of which the road passes. Crossing the railroad tracks and the Housatonic River you roll into Pittsfield by way of the famous South street.

This is one of the prettiest streets in all the Berkshire towns. Great elms and maples flank it on either side, and the street, from the town limits to the pretty oval park where it ends, is bordered with



VIEW OF HOUSATONIC RIVER FROM BRIDGE.
MILL OF THE SMITH PAPER COMPANY AT LEE.

Lenox. If you are of the wise tourists you will affect well equipped garages and repair stations; if you are a labor saving tourist you will want one near your hotel. The Hotel Aspinwall, for instance, will meet your needs. Its proprietor, O. D. Seavey, has this year installed a well equipped supply and repair station in connection with the hotel.

Take the route through the village and run up a rather steep hill past Lenox Church, keeping due north along a delightful road to Pittsfield. On your way you

turf from curb to walk. You will pass many buildings of real historic interest, including the "old fashioned country seat" which Longfellow sings of, and many pretty spots, such as the idyllic Country Club grounds.

Rounding the park keep north on North street to Lanesborough Post Office. This little village is remarkable for its sublime scenery and for being the birthplace of the humorist, "Josh Billings." On your path to Lanesborough you will skirt beautiful Pontoosuc Lake for a portion of the

way and pass, on your right, the mountain known as Brigg's Cobble.

From the heights of Lanesborough the view to the north and west is well worth attention. Across Cheshire may be seen "Old Greylock," a twin peaked mountain, 3,500 feet in height. In the northwest is Potter Mountain, near which are famous touring roads. The general aspect of the country is such as to delight the heart of the tourist.

Touring west from Lanesborough and keeping westward and toward the south, the road touches Pontoosuc Lake—this time on the eastern shore. Just after a sharp turn to the eastward the tourist has the choice of continuing to the northeast as far as Potter Mountain and return (passing the notable Lulu Cascade) or continuing on the return trip to Pittsfield. In the latter event he turns south and has a delightful run on nearly level road past Lake Onoto, far famed for its quiet beauty and as a camping and picnicking resort for

LESSONS OF THE ROAD

Horseless Travel in New Hampshire

By J. W. LOVERING.

I have watched the horseless carriage industry from its infancy with much interest, and have had the impression from the beginning that the gasoline engine had great possibilities in this field, and would in the end be a winner over steam for light everyday use. I am not ready to change that impression at this writing, although it must be admitted that the steam carriage has reached a state of perfection that would have seemed impossible a few years ago.

MOTIVE POWER DECIDED ON.

As I had my mind made up from the beginning on the gasoline machine, one-

I looked over a carriage different from the one I had been watching and asked to be taken out a little way to see its operation. There was another "cranking" man produced to take me out for a spin. He stepped up to the crank with what I considered good nerve, gave it a turn, and much to my surprise the engine started. We drove several miles in as nice a little automobile as I have ever had the pleasure of riding in, but it was a very slow hill climber, which I did not like. Thus ended my first experience, and it lasted some little time, for every time I thought of the automobile the cranking operation came to my mind, and if there was anything I wished guaranteed it was that the engine would start at the first turn; but the anxiety was all useless, as I have an engine in my carriage which has never caused me to give any free street shows, but is always ready to go with the first or second (rarely the latter) turn.

DECIDES ON DOUBLE CYLINDERS.

I soon made up my mind that I would have an engine with two cylinders. Thus half of the last part of the problem in selection was solved. I soon came to the conclusion that the older manufacturers must have weeded out a good part of the imperfections, and so I negotiated with these only, and they told their story very quickly. It seemed as though there was no need of studying the subject at all, it was pictured so rosily.

I finally decided the matter, and have come to the conclusion since that I made a wise selection, and were I to go over the ground again would select the same make, unless it were some of the air cooled motors, which seem to be coming into the field and giving good results. One reason why my mind turns to the air cooled motor is because I have had trouble with the circulating water, of which I will say more later.

The latter part of March I drew my check for \$400, which secured me the promise of an automobile the first of June, and in August I received the real thing, after paying the balance due.

IRREVERSIBLE STEERING GEAR REQUIRED.

The makers insisted on putting on the tiller steering, although they would fit a wheel steer for an additional \$25, but did not consider it nearly so good. I thought with their experience they ought to know, so had the tiller, and am glad that I followed their advice, for later, when I got a rational kind of steering device, I knew how to appreciate it. The tiller was all right for nice, smooth roads, but, unfortunately, in my part of the country such roads are very rare, for they are sandy and full of ruts instead. This tiller steering reminded me of a horse I used to own that was in the habit of falling down unless I kept a tight rein. I used the tiller for about a month, when I took a very sudden dislike to it, owing to the following incident.



N. Y., N. H. & H. R. R. LOOP AT LEE.

people from miles around. You run into Pittsfield from the east.

Leaving Pittsfield the most desirable route, if you wish to cover new territory, is to turn east and, crossing the river and one of its branches, run to Barkerville, turning there to the south by the road which crosses over Osceola Mountain, and winding down the hills enter Lenox from the northeast. The grades have been fairly heavy in the latter portion of the run, but this has been atoned for by the varying scenery which has greeted the eye from moment to moment.

This day's run is not a long one. Probably little more than 25 miles have been covered, but the trip is satisfying in every sense. There are fully fifteen as varied and pleasant trips which could be devised starting from Lenox. When this is multiplied by the numerous other centres in this delightful region the amount of enjoyment obtainable by the tourist who really loves the sport is almost beyond calculation.

half of the problem in selecting was settled, and very early in the year 1902 I began to think it time to settle the other half. My first ride in a gasoline carriage was taken at an agency where they had several different makes for sale. While I was looking them over another prospective buyer arrived on the scene, by appointment, I presumed, as a machine was rolled out at once, and one of the men prepared to show it up by getting ready to take him out for a ride. I was much interested to see the operation of starting, so waited to see them off. Everything ready, the driver gave the crank a turn, or in fact several, but the engine was not ready to go. He looked the machine over and cranked again with the same result; then he went over the engine, adjusting it here and there, and cranked it again, and finally took off his coat for business. I watched the operation for about fifteen minutes, looked at the man who came to take the ride, wondered what he was thinking and went about my business.

AN EXCITING EXPERIENCE.

Early one afternoon I filled up the gasoline tank, oiled all the machinery and took my wife for a drive which I had promised her the night before. We pulled along all right for about 2 miles, when very suddenly the machine ran up edge-wise on the side of the road. My wife was on the ground, and I would have been there if I had not had hold of the tiller, for support. This happened very quickly and in going twice the length of the carriage. I went back to where the wheels left the ruts, which were 3 or 4 inches deep, and found nothing uncommon in the road, except that at the side where I ran off there was a steep drop of about 3 feet and within a foot of the wheel rut was one of those innocent looking places all covered with green running vines, which came close up to the wheel track. My carriage was always making little dodges sidewise when in ruts of just the right depth, owing to the forward wheels tending to climb out of them. A cat was crossing the road about 4 rods in front of us when this little affair took place, and my wife averred that this was what caused the accident; but I am of the opinion that I merely relaxed my eternal grip for just an instant in what proved to be a very dangerous location. When it stopped the carriage was standing at as much of an angle as it possibly could and not go over. The gasoline tank being full, the fluid was running out of the vent on top, down the side of the carriage on to the ground, and I did not dare to start the engine for fear I might get an explosion in the muffler and ignite it, and apparently the engine would have been of little service in the position I was in. I looked the situation over carefully and concluded that by cutting several fair sized trees a path could be made into an open field. The first thing needed was an axe, and this I thought I could obtain at a house not very far off. Now in a country place, when you borrow anything you are supposed to inform the one from whom you borrow what you intend to do with the article. I was not over proud of the position my automobile was in, and being slightly acquainted with the people of the house, I told my wife I thought she was better capable of doing this little errand. The axe secured, in a little while I laid the trees low and managed to get the carriage down off the bank, through the path into the field, and then back into the road. After carrying the axe back we continued our journey. This little incident happened on a crossroad where there was very little travel, and on that particular day we had the whole situation to ourselves, and up to this writing no one knows of the particulars. During the rest of the trip I gave the nice, green viney places I chanced to meet a good wide berth, and my next trip was to Lynn, Mass., where I had the tiller removed and a side lever steering put on,

with the Lemp check attachment, since which time I have felt perfectly safe in so far as the steering is concerned, and am not obliged to give my individual attention to steering alone.

Wheel steering may be superior, but I doubt it. Mine is as good as I desire. My wheels will now follow and keep in the ruts instead of continually trying to get out of them.

COOLING WATER TROUBLE.

When I received my carriage I noticed that the car in which it was shipped was very wet underneath the carriage, but thought nothing of it at the time. A little later, after getting it into my own premises, I noticed the same thing, and on examination found that nearly every joint in the piping leaked, and so began a thorough repiping, which necessitated drawing off the water. Any joint in this piping could easily be given a full turn in, and in some cases two. After repiping I filled the water tanks and was ready for action. I ran the carriage only about a mile and noticed the water was boiling. When I stopped the water soon cooled off; if I started again it would soon begin to boil; but the more I used it the better it grew, and finally the trouble ceased. I would find another leak every few days, and out would have to come the cooling water to stop same, and another nursing operation would have to be gone through. As the leaks became less frequent the heating grew worse. I remember one particularly bad experience. It was on a fine Sunday when my wife and I had planned for a long drive. I filled the gasoline tank, and while tightening up a little here and there I found a leak around one of the studs which hold the engine to its foundation. These had all leaked a little from the beginning. I thought I had time to draw off the water and lead the stud in, fill up and go through the nursing operation before my wife arrived. I did the job very quickly, but then came the tussle. I ran up and down the road, stopping every little while to let the water cool, and when the churchgoers were occupying the road I confined my operations to my factory yard. In the meantime my wife arrived on the scene ready for the start. We jiggered around, and before I got the water settled it was too late to go anywhere, except to church again.

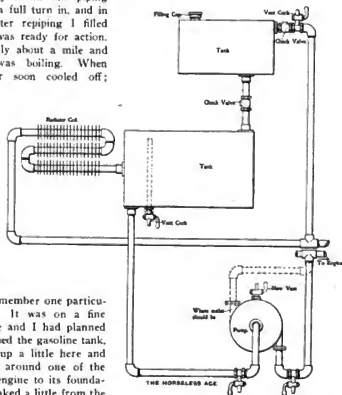
I never found a leak after that that I considered of sufficient importance to necessitate the drawing off of the cooling water. As cold weather approached I had to draw it off, however, in order to use the anti-freeze solution. I made the regu-

lation solution, of water and calcium chloride, and put it in, thinking possibly it might eat its way through. Winter came on so suddenly that I didn't have time to get it into working order before it was too cold to drive. Through the winter I made

A SPARK ADVANCING ARRANGEMENT,

my engine not being fitted with this device, and as spring approached fitted it on. The job being completed, I tested it every little while in my carriage house, but could not make a long test at any one time, because the cooling fluid heated up very quickly.

I wrote the makers of my carriage, telling them I thought there must be an air pocket somewhere in the system. They replied that if this was the case, heating up the water and letting it cool would release the air. I continued to heat up the anti-freeze and anti-circulator until I was tired



of the operation, but determined that before my carriage left its winter home this difficulty should be ferreted out and a remedy provided. I began by making a complete drawing of the whole circulating system and placed it on my desk to study at my convenience. The first lesson was sufficient to convince me that the makers had not reached the bottom of the difficulty.

THE COOLING SYSTEM.

The following is a description of the system used. The water pipe from the tank dropped down below the pump; the inlet pipe came up and entered it at the centre on one side in the usual way; the outlet from the pump to the cylinder was at the bottom and was connected to the cylinders above the pump by a return bend and

pipings. The operation of this was as follows: Suppose the whole system to be empty. As water was put into the tank it would drop down through the inlet pipe, flow up and into the centre of the pump, drop down through the outlet at the bottom (which should have been on top, by the way) into the return bend and up to the cylinders, making a complete trap each side of the pump, and leaving the same full of air. I enclose a drawing of the arrangement.

My next operation was to drill a vent hole in the casing on top of the pump, and, as I expected, when the drill went through there came out a puff of air that sent the drill chips in all directions. Then up came the anti-circulator fluid. I tapped the hole, screwed in a small piece of copper pipe, placed an air cock on top, started the engine, and the way that anti-freeze heated up those radiator coils, which before had acted as ornaments only, was refreshing. I have taken the anti-freeze out now and replaced it with clear water; in fact, I have filled and drawn it off several times with no trouble whatever, and now my carriage is always ready to go every day in the week, Sundays included.

THE SPRINGS.

My carriage was fitted with a detachable front seat, making it capable of carrying four. This seat I have used but once, as the forward springs were too weak, and the passenger I then took says she will never forget the ride. It was nothing but a continual bump, two persons on this seat bringing the springs together even when the carriage was standing still. I have since had a new set of springs put on which are capable of doing the work. Before the new springs were attached it was very disagreeable riding with even two passengers, as I could go only at a slow pace except on the very smoothest roads. On one trip I came near losing my water tank, which had been loosened by the continual jarring. As this was quite an interesting trip, covering 86 miles, it may be of interest to the readers of this paper if I describe some of the more important incidents.

Starting about 9 o'clock one pleasant morning, my wife and I headed our way toward the ocean. An errand at a neighbor's delayed the real starting somewhat. While we were at the neighbor's house he wanted to have his colt see the automobile. He told his boy to lead the animal out and see if it was afraid of the "darned" thing, but the boy objected, saying: "You lead him out." The farmer said: "The colt won't care anything about it. Lead him out." This seemed to give the boy courage, and he produced the animal. I had stopped the engine so as to let the colt have as favorable an impression as possible. The animal seemed not in the least afraid, and the farmer said: "I told you he would not mind it. Now start her up." Getting out, I gave the crank a

turn; the engine responded promptly. The colt, which was watching the operation, gave a sudden fling, pulling the halter from the boy's hand, cleared a barbed wire fence at one bound, and disappeared. We then continued our journey.

A HORSE CHASE.

Everything went along nicely until we came to a house where a horse was grazing in the front yard. On seeing us he stopped, pricked up his ears, and as we drew nearer gave a snort and started down the road in front of us. He kept in the middle of the road and some little way ahead for half a mile or so, when he suddenly came to a halt, turned and faced us. As we approached he turned again, and with head and tail in the air continued his journey. At times we would come up near him, when with renewed vigor he would again go on, always in the middle of the road, so that it was impossible for us to get by him. He kept this up for two or more miles, and finally stopped in a fairly wide stretch of road. I then stopped my carriage, got out, climbed the fence, and managed to get ahead of him and drive him back past the automobile. Had I not done this I think it probable he would have taken a view of the ocean that day.

Arriving at Hampton Beach about noon, I wished to view a new bridge connecting this beach with Salisbury. The road leading to this bridge was new, but had a fair amount of grading on it, and as it was level I did not anticipate any trouble. After spinning along for some distance the engine began to slow up, and I dropped into the second speed. A little farther I had to drop into the slow speed, and even on this the engine failed to pick up, and I was beginning to think there was something the matter with the mixture, when I chanced to look back and see my tracks. Instantly I stopped, and then there concluded I would postpone my inspection of the new bridge. I was in

DEEP SAND.

I tried backing out, but it did not prove successful. Furthermore, I dislike to back out of a bad situation. I soon found that every move must be a practical one, or I should work the carriage into the sand up to the hubs. Had I had time and a camera with me I would have taken a snap shot and sent the picture to THE HORSELESS AGE, telling what a powerful machine I possessed.

By digging the sand from in front of every wheel and speeding the engine up to the limit I could move about a foot. Then I wished for an automobile such as some of your correspondents write about, one that would plod along through sand a foot deep with hardly any effort.

After about an hour's work I got out, but if that engine and transmission gear had not been made of good material something would surely have given away. As I pulled back over this piece of road the

wheels cut into the sand about 4 inches, and it was all I could do to pull along on the slow speed.

My machine has taken every hill encountered with ease, and there are some pretty good ones in this part of New Hampshire, but 3 or 4 inches of sand on level ground is a pretty tough problem for it. So I wonder when I read about automobiles going along with ease in sand nearly up to the hubs. After this we pulled along over the ocean road toward Portsmouth, where we took dinner with a friend.

(To be continued.)

One Thousand Miles in a Gasoline Tonneau.

By DR. H. R. FARINGER.

My road experience with this machine has been quite satisfactory; that is to say, I have never had very much trouble, and never during the 1,000 miles and over have I been left powerless along the road and had to be towed home. Of course my time may come, as it did about two years ago when I owned a steam carriage; when once I had a false water column and my boiler burned out, and the other time the cylinder head blew out, owing to the piston becoming detached from the driving crank and bouncing up and down in the cylinder. The steam machine was not at all satisfactory for a physician's service, so I disposed of it and waited until gasoline vehicles became more practical.

I decided upon this particular make of machine because it was strong, easy to get into (i. e., low), without chain and capable of taking more than two at a time, and so far I have been very much satisfied with it. Of course, I have my troubles, as I drive it and help to repair and adjust it myself, and I do not employ an expert mechanic to keep it in repair. I find the most time is spent in keeping it free from dust and mud and in keeping the parts oiled well. This my stable boy does for me. I have taught my boy much about it and now he knows just what to do.

My main trouble has been, I think, with my sparking. I have adjusted it and re-adjusted it, and even now I have some trouble at times. Early ignitions will occur in the engine, just before the compression dead centre, especially when the engine is slowed down on a grade or on a hard pull through deep sand. As long as the engine—which is, of a double cylinder opposed type—is kept at a high rate of speed I have no trouble.

This pre-explosion is not due to overheating of the plugs or explosion chamber. When throwing in a higher gear these back explosions are sometimes so pronounced as to stop the engine or stop the whole car.

THE FIRST PUNCTURE.

During the 1,000 miles driving I have had only one puncture of the rear tire.

This was caused by a couple of boys putting a wire nail on the car track which I was steering in about dusk. I had not noticed the boys until they ran back from the track to await the reward of their devilishness. My attention was called to a roughness in riding about 2 miles from where the boys were, and just as I made a sharp turn the shoe of the hind wheel came off and I readily found what its cause was.

The nail evidently did not make a complete puncture at first, but in going the 2 miles it worked its way through the inner tube. It being dark and having some 16 miles to get home, I decided at once to pull off the other rear tire and run home on the rims. On I started, but such a noise! People along the route thought a steam thrasher was coming. I had not gone far, however, over cobbles and stone roads, when I discovered the rims were very much battered and flattened out. I thought they were spoiled already and could not be hurt much more, so I continued homeward with three in the car. A brace on the rear axle which carried the rear gear case was also fractured; it began to grind and become heated, and had to be cooled every few miles, but finally we got home. This was the most serious trouble I have had, and if I had left the machine over night or repaired same I could have avoided a bill for repairs.

EXPENSE.

By taking care of my car myself I am able to run it for a great deal less money than it would cost to rent an extra stable and pay extra help and for repairs of minor degree. I also buy my gasoline in 25 gallon lots, thereby getting same for 13 cents per gallon. My lubricating oil I get for 40 cents per gallon in 5 gallon lots.

FUEL AND OIL COST.

In running the 1,000 miles I find my expense for oil and gasoline, not including ferry tickets and road toll, has been a little less than 1 1/4 cents per mile, or an average of one-third of a cent per passenger mile when carrying four persons. I find that it requires very little more gasoline to take four than two persons.

A fine or lawsuit for accident to a person is the most serious question in my mind. There are times when even the most careful driver of a motor vehicle will be the cause of an accident to someone or somebody's team, and its the uppermost thought of such an injured person to at once cause the arrest of the driver and attempt to recover damages. People in some localities are quite averse to having motor vehicles on the public road, even though such vehicles are licensed, and would not hesitate to cause trouble for an automobilist in whatever way they could. As our courts of justice grossly misunderstand the efforts of a driver to avoid accident, it is not only annoying to be hauled up but also expensive, even when a chauffeur is not disobeying the law in any particular.

It is therefore the duty of every operator of a motor vehicle to be on the safe side every time and obey the law, as he then has the law to protect him in case of any trouble.

I am glad to say that so far I have not been the cause of any serious accident. The only accident which was caused by my vehicle was a runaway of a pair of young horses, but no damage was done except a broken shaft pole. The driver managed to escape injury, and I at once assisted him in recovering his horses. The team became unmanageable after I had passed some 20 yards.

Artificial Pumice Stone for Porous Separators.

As none of the porous materials found in nature are of sufficient and uniform porosity, mechanical strength and resistance against the effects of acids, alkalis, etc., a number of artificial substances have been produced. The best among these so far have been substances corresponding to terra cotta and obtained by mixing pulverized combustible materials with a mass of clay and burning it. Clay is a mixture of silicates of different alkaline earths, the fusing point of which is comparatively low. This prescribes only moderate burning, as otherwise the surface would become glazed and the whole mass impetrable. On account of the moderate burning the mass remains comparatively weak mechanically and the pores must be of very restricted dimensions. Besides, the clay particles are not rendered proof against the influence of chemical agents by such moderate burning.

These drawbacks are claimed to have been overcome by a process patented in Germany by Paul Chapuy & Co., who instead of clay use kaolin, which consists of almost chemically pure aluminum silicate and begins to fuse only at a very high temperature. The fusing takes place very gradually, so that there is a large temperature difference between the stages where the material begins to soften and where it becomes fluid. The material is raised to a temperature intermediate these two, when all contacting particles of the kaolin are welded together, without there being any danger of the surface becoming glazed. In this manner a product of sufficient mechanical strength is obtained, which permits of a high degree of porosity—a large number of pores and appreciable dimensions of the individual pores. The size of the pores can be controlled to a nicety if the carbon particles which are to be mixed with the kaolin are sifted twice. The temperature at which kaolin softens is considerably higher than that at which the aluminum silicate becomes proof against the effects of chemicals.

Care must be had that the carbon employed does not contain salts of the alkaline metals in quantity sufficient to act as a

solvent when brought in contact with the aluminum silicate, for the formation of alkaline silicates would considerably reduce the temperature at which the surface of kaolin particles becomes fluid, and there would be danger of internal glazing, which would close the openings by which the pores must communicate with each other. Good results are secured either by washing the carbon employed in acid solution and then in running water or, preferably, by selecting carbon of sufficient purity. The products obtained, with their semi-glazed cell surfaces, differ in appearance and mechanical strength greatly from terra cotta, and resemble pumice stone in their mechanical rigidity, their resistance to chemical attack and their high porosity. For battery purposes they are claimed to be much superior to natural pumice stone, owing to the uniformity of their pores and because all the pores are in free communication with each other, while in natural pumice stone many pores, owing to their partial communication and their partial separation form closed spaces which are not reached by the fluids.—*Zeitschrift f. Elementenkunde.*

United States Patents in 1902.

From the report of United States Commissioner of Patents F. I. Allen for the year 1902, just published, we take the following:

In 1902 there were received 48,320 applications for mechanical patents, 1,770 applications for design patents and 151 applications for reissues of patents. There were 27,776 patents issued, including designs, and 110 patents reissued. The number of patents that expired was 23,331. The total balance to the credit of the Patent Office in the treasury of the United States on January 1, 1903, was \$5,488,984.61.

In proportion to population more patents were issued to citizens of the District of Columbia than to those of any of the States or Territories—one to every 1,080. Next in order are the following: Connecticut, 1 to every 1,240; Massachusetts, 1 to every 1,439; Rhode Island, 1 to every 1,558; New Jersey, 1 to every 1,605; Colorado, 1 to every 1,670; California, 1 to every 1,738; New York, 1 to every 1,764; Illinois, 1 to every 1,906; Pennsylvania, 1 to every 2,257; Ohio, 1 to every 2,271; Washington, 1 to every 2,712.

As to foreign patents, 1,000 were granted to residents of England; 956 to those of Germany; 392 to those of Canada; 346 to those of France; 132 to those of Austria-Hungary; 104 to those of Scotland; 78 to those of Switzerland; 63 to those of Sweden; 50 to those of Russia.

The Patent Office issued 27,886 patents during the year 1902, the largest annual issue in its entire history. Previous to this 1902 was the record year. Owing to the constantly growing amount of business the buildings are becoming inadequate.

NEW VEHICLES AND PARTS.

The Pierce Arrow Touring Car.

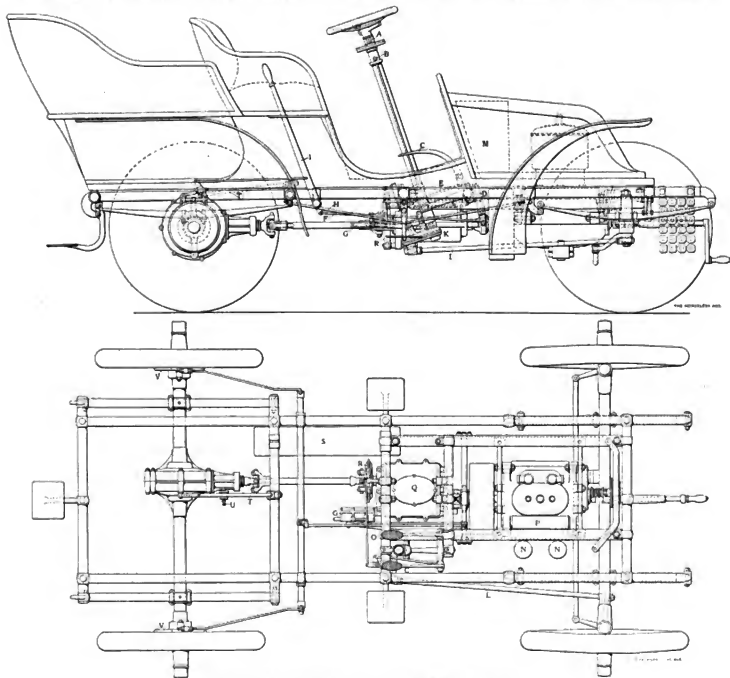
In the design of this car it has been the endeavor of the manufacturers, the Geo. N. Pierce Company, Buffalo, N. Y., to produce a light yet strong and well powered touring car. The weight of the car complete is 1,700 pounds, and the motor is a double cylinder genuine De Dion of 15 brake horse power. The wheel base of the car is 81 inches and the tread 54 inches. The under frame is of Shelby steel tubing, 1 3/4 inches in diameter by 12 B. W. G., brazed into steel lugs and trussed in the centre, making a structure well calculated to stand severe usage. The construction of this is

shown in Figs. 1 and 2, which show a side elevation and plan of the assembled car. The under frame is suspended from the front and rear axles by long semi-elliptic springs, making a very easy riding car. In addition to the spring suspension, disks of rubber are fastened to the carriage body between it and the frame, which effectually deaden vibration.

The motor, which is similar in construction to the smaller one of 12 horse power described in THE HORSELESS AGE of May 13 last, is attached to two very rigid angle steel bars, which also support the transmission gear case. These angle bars are supported on the cross frame tubes only at their outer ends, so that any sagging of the side frame tubes will not

affect the alignment of the crank shaft and transmission gear shaft. As an additional safeguard there is a flexible claw coupling between these parts.

The flywheel of the motor is bolted onto a flange on the crank shaft, and forms the external, conical part of the friction clutch. Inside this is an aluminum internal clutch cone, faced with leather. The construction of this is shown in Fig. 3. It will be seen that when the clutch is in gear there is no thrust on any bearing. The clutch A is released by depressing a foot lever which is connected to the collar B, thus compressing the spring C, the thrust of which is taken by the ball thrust bearing D. On the end of the first motion transmission shaft E is a claw clutch F



FIGS. 1 AND 2—ELEVATION AND PLAN OF PIERCE TOURING CAR.

A, gear changing lever; B, ignition timer; C, brake pedal; D, friction clutch lever; E, foot brake operating rod; F, rod interconnecting hand brake and friction clutch; G, gear locking mechanism; H, frame truss; I, hub brake lever; K, steering reduction gear; L, steering connection rod; M, water tank; N, carburetor; O, clutch pedal; P, oil reservoir; Q, door to change gear box; R, foot brake; S, muffler; T, torsion brace, rod for bevel gear drive; U, grease cup for bevel pinion shaft; V, hub brakes.

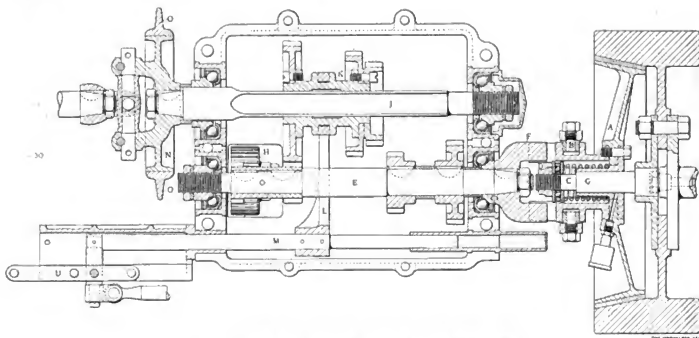


FIG. 3.—HORIZONTAL SECTION THROUGH TRANSMISSION GEAR.

having two fingers which engage with slots in the hub of the friction clutch. This allows the friction clutch A to be moved along the extension G on which it rests when out of gear.

TRANSMISSION GEAR.

The transmission gear runs entirely on ball bearings. The gear gives three speeds forward and a reverse by a simple, continuous motion of the shifting lever. On the first shaft E of the transmission are keyed four gear pinions, which are rigidly held against longitudinal motion by collars and shoulders on the shaft. The pinion farthest away from the clutch is constantly in mesh with an intermediate pinion H for the reverse, revolving on a short shaft (X, Fig. 4), below the shaft E. The three gear wheels on the second transmission shaft J are all bolted to the sleeve K,

which has a square hole in it and can be made to slide along the square shaft. In this manner any one of the three gears can be brought in mesh with its respective pinion on the shaft E, and the low speed gear also with the intermediate pinion H for reversing. The shifting is effected by means of the forked arm L, which is fixed to the shifting rod M, having bearings in the crank case. All the gears are hardened and the teeth tapered off, to facilitate meshing them. The pinion and gear for the high speed are of the same pitch diameter, while the gear for the low speed and reverse is of about three and a half times the pitch diameter of these pinions. The low gear and reverse are therefore three and a half times lower than the high gear.

On the shaft J outside the casing is

keyed a brake drum N, on which a block brake acts. This brake is operated by a pedal; its construction is plainly shown in Fig. 4. The two ribbed blocks O O are pivoted at their lower end to the gear case and their upper ends may be drawn together and the blocks thereby applied to the drum by means of a toggle arrangement T. A coiled spring P normally keeps both blocks free of the drum. The brake drum forms part of the universal joint by which the power is transmitted to the rear axle. The drum is fastened to its shaft with a taper fit, key, nut and pin.

THE CHAINLESS DRIVE.

The car is provided with a live rear axle and bevel gear drive. At each end of the "propeller" shaft is a universal joint. One part of the rear universal joint (A, Fig. 6), has a square hole in it and can slide upon

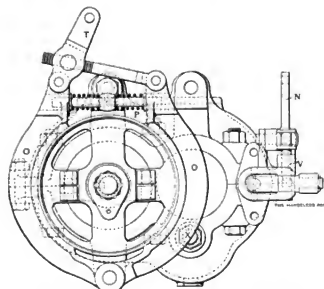


FIG. 4.—END VIEW OF TRANSMISSION GEAR CASE.

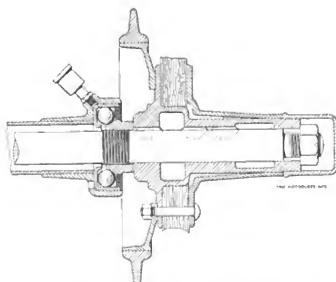


FIG. 5.—REAR WHEEL HUB AND BEARING.

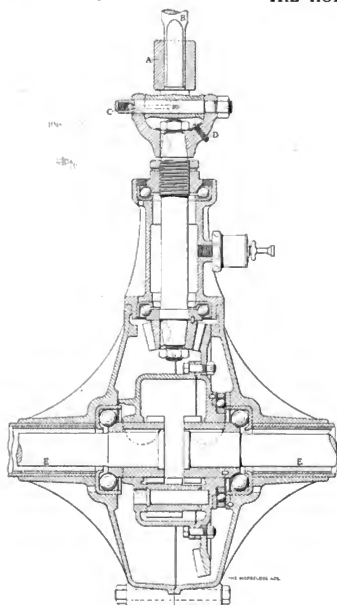


FIG. 6.—BEVEL GEAR DRIVE.

the square portion of the shaft B, thus allowing of the shortening of the longitudinal shaft when the springs are depressed. The bevel pinion and gear have fourteen and sixty-four teeth respectively. The differential gear is of the spur type, and is enclosed, together with the driving gear, in a casing on the rear axle.

The rear axle is extra heavy and runs on large ball bearings. The thrust of the large bevel gear is taken by a separate thrust ball bearing entirely independent of the driving axle bearings, so that it is impossible for the bevel gears to be drawn out of mesh by the wear and consequent adjustment of the driving axle bearings. These gears are hardened and run in oil and grease.

In connection with Fig. 6 attention should be called to the oiling arrangement C for the universal joint, the locking device D for the nut holding the universal joint to the bevel pinion shaft, and the tubular re-enforcements E E of the rear axle tubes near their joint with the gear case.

The steel brake drums are bolted direct to the rear hubs and are encircled by the bronze brake shoes, which act equally effectually in either direction. The construction of these is the same as the transmission shaft brake, as shown in Fig. 4. The hub brakes are operated by a long lever on the right hand side of the carriage, which can be locked in any position. The putting on of this brake throws the friction clutch out of gear, thus disconnecting the engine. The foot pedal brake does the same.

THE STEERING GEAR.

The car is steered by means of a large diameter hand wheel A on top of a slightly inclined tubular steering post B. To the lower end of this post is fixed a spur pinion C meshing with a toothed sector D on a short shaft E. To the lower end of this shaft is keyed the lever arm F, from which connection is made to the steering knuckle. The pinion C and sector D are inclosed in a dustproof case, which is filled with oil and grease. The advantage of using spur gears for the reducing motion is claimed to be that the excessive lost motion that

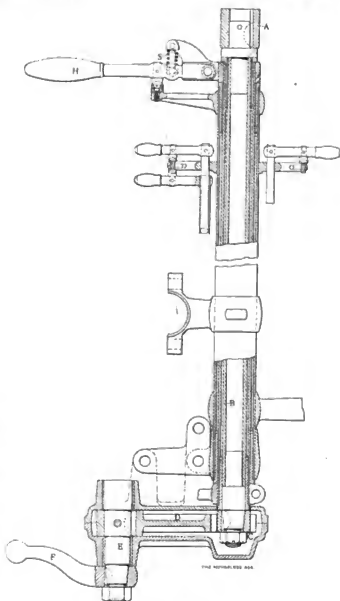


FIG. 7.—STEERING GEAR.

soon occurs with worm gears is avoided.

The steering column consists of three concentric tubes. The outer of these serves as a standard or support; the second for changing the gear and the inner one for steering. The gear lever works on a quadrant with notches for the different speeds, and being directly under the operator's hand it is claimed to be impossible to make a mistake in engaging the desired speed. There are also mounted on the steering column three small handles for operating the ignition timer, the carburetor and the variable exhaust respectively. The gear change lever H is held in the notches by means of a spring S.

GEAR INTERLOCKING DEVICE.

The car is provided with an interlocking device, which can be seen in Figs. 1, 2 and 4. This makes the stripping of the gears in shifting from one speed to another practically an impossibility, as it is not possible to move the gears until first the friction clutch is released by depressing the clutch pedal, and it is not possible to

engage the clutch until the two desired gears are in perfect mesh. This is accomplished by an extension (U, Fig. 3) of the gear shifting rod, having holes in it for the different positions of the gears (see Fig. 1). Into these holes drops a bolt (V, Fig. 4) connected by a bell crank lever W to the clutch, so that when the clutch pedal is depressed the clutch is thrown out of engagement and the bolt is withdrawn. Then the gear shifting rod is free to be moved by means of the gear changing lever. Should the pressure on the clutch pedal be released before the required gears are fully in mesh the bolt will bear upon the upper surface of the shifting rod, and will hold the clutch out of engagement until the gears have been moved into full mesh. When one of the holes in the shifting rod comes opposite the bolt, the latter drops in and allows the clutch to be engaged, and it is impossible to move the gear changing lever until first this bolt is withdrawn by depressing the clutch pedal and releasing the clutch. When the friction clutch is released the exhaust control or throttle is partially closed, so that there is no racing of the engine when coasting or changing gears.

One supply of lubricating oil for the engine will run the car about 350 miles, it is claimed. The oil is pumped from the engine crank case to a tank on the top of the motor from which large diameter tubes lead to all bearings.

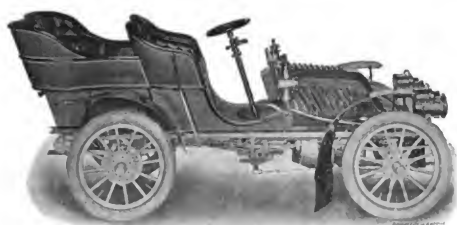
The water supply is said to be sufficient for 400 miles without refilling, and the gasoline capacity is enough for 150 miles. The tonneau is detachable, and has seating capacity for three people. The front seat is of the individual type. A sheet aluminum cover protects the under side of the motor and transmission gear.

Woods Electric Tonneau.

The Woods Motor Vehicle Company, of Chicago, has recently brought out a tonneau design of electric vehicle, which is illustrated herewith. The car will be seen to have the same general appearance as the latest models of gasoline touring cars. We are informed that the vehicle has been subjected to tests for the last four weeks and that it has satisfactorily met all the road conditions of Chicago and its suburbs.

The wheel base of this car is 88 inches and the tread 56 inches. The wheels are of the wood artillery type with steel hubs and 2½ inch solid tires; they are 32 inches in diameter in front and 36 inches in the rear. The car has a double motor equipment, each motor being rated at 2½ horse power. The controller gives four speeds, of 5, 10, 14 and 18 miles per hour, respectively, both forward and reverse.

The storage battery consists of forty cells with a capacity of 160 ampere hours. Twenty of the cells are placed in front under the bonnet and the other twenty under the front seat. The car is claimed to have a radius of 60 miles on one charge over level asphalt or macadamized roads. The



PIERCE "ARROW" TOURING CAR.

total weight is 3,200 pounds. Wheel steering is fitted and two independent brakes are provided, one being applied by a pedal and the other by means of the controller lever.

The body is of a special high back tonneau design, with individual front seats and removable tonneau, having a seating capacity for four passengers and operator. The body is painted Brewster green and the running gear red. The trimming is in green leather. The equipment includes three headlights and one rear lamp.

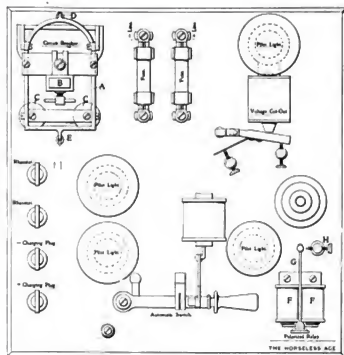
Garrett's Battery Charging Board.

A switchboard for charging automobile batteries, which is provided with the necessary automatic devices to protect the batteries against reversal of current and to cut off the charging current when the charge is completed, is being manufactured by Henry Garrett, of Dallas, Tex., to whom several novel features of the construction are secured by patent. A plan view of the board is shown in the accompanying drawing. The line wires are connected to a pair of terminals located in the middle of the board near the top. Directly below these terminals are a pair of fuses. The automatic circuit breaker is located in the upper left hand corner of the board and a relay magnet in the upper right hand corner. Ranged along the lower part of the left hand edge of the board are four binding posts, the upper two for connection to the rheostat and the lower two for connection to the battery. At the lower right hand corner of the board is located a polarized cut-out which serves to protect the battery against a reversal of the line current, and in the lower middle part of the board is seen an automatic switch. In addition there are mounted on the board a number of pilot lamps.

Referring to the drawing and also to the photo, the circuit breaker comprises a swinging arm A on which is mounted a carbon brush B. The swinging arm is under the control of the solenoids C C and the spring D. The cores of the solenoids are fixed to a yoke which is pivoted to the



WOODS ELECTRIC TONNEAU.



LAYOUT OF GARRETT'S CHARGING BOARD.

swinging arm A. The carbon brush B is normally held in contact with a similar brush below it fastened to the circuit breaker frame; but when the current flowing through the solenoids CC is weakened in a certain degree the spring D overpowers the solenoids and draws the two carbon brushes apart, thus breaking the main circuit. A chain E prevents the swinging arm from flying outward beyond a certain point. The result is that the charging of the battery is stopped the instant the voltage of the feed wires drops too low, from any cause whatever, such as

the current passing through the solenoids gradually increases with the increase of charging potential. This does not affect the circuit breaker, however, beyond slightly increasing the pressure between the carbons. The circuit breaker operates only when the line potential drops below a certain predetermined value. It is claimed that there is no arc at the carbons when the latter separate, as the opposing pressures of the line and the battery practically neutralize each other when the circuit breaker opens, the instrument being adjusted to operate at 5 to 8 volts above the battery maximum.

The lamps in series with the solenoids act as pilot lights and also allow of changing the power charging circuit from 110 volts to 220 volts, more or less, lamps being used according to charging voltage. On 110 volts one lamp is sufficient, while on 220 volts two lamps must be used. These lamps only light a dull red and therefore last indefinitely.

THE POLARIZED CUT-OUT.

The polarized cut-out serves the purpose of preventing the battery being connected to the line when the polarity of the latter is wrong either owing to wrong connection or to a re-

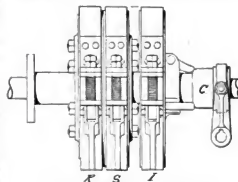
versal of the polarity of the charging dynamo. This device would also act in the case—very unlikely, however—where the outside mains had become crossed and the fuses and circuit breaker failed to do their work. The reverse current in such a case would cause the polarized magnet F to be energized in the opposite direction and the contact G would be brought over to contact H, and the automatic switch would be thrown and instantly open the circuit.

This board, we are informed, has been in use for over a year and is said to have proved absolutely reliable. Its operation is very simple. To charge the battery the charging plug is connected to the socket on the vehicle, the automatic switch on the board is thrown in and finally the line switch, which may be placed in any convenient place on the wall, is closed. The device will then automatically take care of the charging. When the automatic switch is out both sides of the circuit are open.

The "Triumph" Transmission Gears.

The F. A. La Roche Company, Hudson street, New York, have been appointed sole sales agents for the "Triumph" transmission gears on which a patent has been granted to R. W. Coffee & Son, of Richmond, Va.

These gears are made in four sizes: No. 1, two speeds and a reverse for 6 horse power; No. 2, three speeds and a reverse for 10 horse power; No. 3, three speeds and a reverse for 16 horse power, and No. 4, three speeds and a reverse for 20 horse power engines. In the accompanying cut I is the brake band that controls the intermediate speed, which in the No. 4 gear gives a reduction of 2 to 1. R is the reversing gear, which gives a reduction of 7 to 1 and is, therefore, a most efficient means for stopping the car, climbing the steepest grades or pulling out of bad places. The slow speed S gives a reduction of 4 to 1. Both the reverse and slow speeds are obtained by means of planetary gears, of which there are as many in this device as are used in a two speed gear of the planetary type. The high speed is direct and is brought into action by forcing in the cone C to the left and spreading the pawls apart, causing the friction disks to bind in the



TRIUMPH TRANSMISSION GEAR.



THE GARRETT CHARGING BOARD.

usual manner. The brake bands are of machine steel and have no lining.

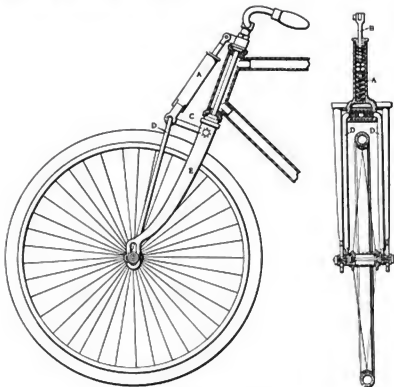
The manufacturers claim that only the best metals and the highest grade of workmanship enter into these gears and that all the parts are of generous proportions.

The Thomas Truss Spring Fork.

To absorb, dissipate and cushion the shocks to which the front forks of motor cycles are subjected when traveling on a rough road, the E. R. Thomas Motor Company, of Buffalo, N. Y., have equipped their 1903 model "Auto-Bi" (No. 35) with the device shown in the accompanying cut.

One of the views is a side elevation and the other a front elevation of this useful attachment. The hollow cylinder A contains two helical compression springs between which two nuts are interposed into which a forked rod B has been screwed. The cylinder is forked at the bottom so that it embraces the hub of the link C which holds one end of the links D D in place.

When the front wheel strikes an obstruction the lower one of the coiled springs is compressed and the front fork E of the cycle assumes a lower position relatively to the front wheel. As soon as the shock has become dissipated the spring recoils and the front fork rises until it assumes its normal position. The upper coiled spring is employed to prevent excessive recoil action and must be regarded as a buffer. It is evident that the fork



THOMAS TRUSS SPRING FORK.

proper does not carry the weight that the front wheel must suspend, and that the fork's office is but to guide the wheel. All blows coming from below do not throw a strain on the fork; unless the front wheel strikes a high obstruction, such as would

be encountered should the rider try to mount a high curbstone.

The manufacturers claim that this device gives their product superior riding qualities and that accidents have been avoided by its use.

COMMUNICATIONS.

An Electric and Gasoline Caravan Over Texas Roads.

Editor HORSELESS AGE:

I send you herewith some photos taken on a trip from Dallas to Fort Worth, Tex. A patent medicine concern had decided to display an electric sign on the streets of Fort Worth during a street fair, and to this end made arrangements with O. A. Jennings, of Dallas, owner of an electric carriage, to carry the sign. As the electric carriage was not capable of making the trip from Dallas to the Fort without recharging, and as there are no charging facilities on the route, Mr. Jennings made arrangements with the writer to help him there by means of his gasoline machine.

I put a small electric generator on the back of the electric car, and we started on our way with another electric for company. The first two miles were made in fine shape. We were moving along at a pretty fast gait, when I heard Jennings shout, and on looking back saw him heading for a pool of water about 6 feet



TOURING IN TEXAS—RECHARGING THE ELECTRIC.

below the level of the pike. He managed to stop just in time to save himself getting a bath, although I think that, in view of the dusty condition of the road and the fact that he drove behind, a bath would have done him no harm.

Upon examining his machine we found that one of the front springs had broken, which let the body down on the steering gear, locking it so tight that the driver had no control of the machine. We took some barbed wire from a fence nearby and some sticks and wired the broken parts together, which enabled us to cover the next 5 miles. At that point we found a blacksmith shop, and there we had a new spring put in. While this work was being done we backed the machines together, put a belt over the pulley of the generator and the flywheel of the gasoline engine and began charging the electric. It took something like four hours to charge the first machine, and as it would have detained us considerably to charge the second machine in the same manner we decided to leave it there and take it back with us on our return trip.

When we took the blocks out from under the machine and let the weight down on the new spring, it broke. The blacksmith looked at it for a while and then said, "The thing must be heavy." We had to wait another two hours for another spring to be put in, which proved all right and capable of supporting the weight. Jennings started on his way while I was taking in water, and when I caught up to him after about 3 miles running his machine was dead. So we decided not to use the generator any more, but I threw out the life line and towed him into Fort Worth. The other spring on his vehicle broke just as we got into town. Just why the charge did not run him any further than 3 miles I cannot tell, for we ran 15 amperes at 115 volts into the battery until he said it was full.

At 5 o'clock Henry Garrett, who owned the other electric, and myself started on the return trip. Having nothing to bother with, and the roads being good, I decided to give him a good ride back to Dallas, a distance of 36 miles. We sailed along finely for about 12 miles and I felt highly elated and would not have changed places with the Governor; but at the end of that distance I would not have given 15 cents for my place, machine or anything else, for just after passing a farm wagon on an up grade and having arrived at the top of the grade, I tried to throw in the low gear, but it refused to take hold; so I tried the brake, which also refused to work, and finally applied the emergency brake with the same result. There was nothing left to do but steer the machine to one side down the hill and jump out. In jumping I caught my little finger in the rear wheel, but managed to get it loose, and then stood and looked at Garrett and the machine flying down the hill into a ditch, but without doing any harm.

The engine was still running when I got to it.

The cause of all this trouble I found to be that the set screw which holds the key in the differential had worked out. The first thing we did was to get a farmer to pull us out of the ditch and up the hill, where we went to work to fix the machine, which took us about two hours, and then with the aid of the farmer and his lantern we made the trip home without further trouble. The first thing I did the next morning was to drill holes through the set screws and put a lap ring around the hub of the gears and through the holes in the set screws, so they cannot possibly work loose again.

Four days later I went again to Fort Worth, to get Jennings. Having lost confidence in the generator, I did not bother with it, but had the electric fully charged before leaving, so as to help over the hills, and towed him over the level roads as fast as his machine would stand without shaking the batteries to pieces. In fact, the strain on the battery was so hard that he didn't have enough juice to burn his headlight, let alone running the wagon. On one of the hills my engine stopped and my car ran back against his and broke the exhaust pipe off near the engine. There being a few threads left on the end of the pipe, I took the piece broken off out of the cylinder and screwed the pipe back in place. We had no further trouble until getting home, but I decided that when an electric machine is to be transported any distance the best thing is to use a box car.

D. W. McELROY.

Steering Checks.

LEOMINSTER, Mass., June 21.

Editor HORSELESS AGE:

I note in THE HORSELESS AGE of June 17 the inquiry of Mr. E. M. Carr, and wish to say that there is a steering check made that will just fill Mr. Carr's requirements. It is a hydraulic check that works with perfect steering and locks the wheels perfectly, still with a slight cushion effect that prevents straining the other parts of the automobile.

Last year I had one put on my air cooled gasoline machine that weighed over 1,300 pounds. This year I have a new machine of the same make that weighs over 1,700 pounds, and I have had the check put on this also. I have driven the machine about 2,000 miles, and my total with the two checks is over 4,000 miles, over all kinds of roads that New England can furnish.

The greatest benefit is derived when going over rough or hard roads of any kind. In deep sand or over very rough pavements I get the most comfort out of it, as it holds the course and all vibration is removed from the steering bar. With four in the machine I find it practically as easy to steer as with two, which is very

different from the straight steering that the automobile was fitted with.

I should not hesitate to use this on a car of 2,500 pounds, but for anything under 2,000 pounds I consider it the only real safe steering that I have seen. This is not intended to reflect on other checks. I have not tried any others. I intend to compare only with direct connected steering without check of any kind. Every user of this kind of steering I think is taking great chances of accidents that he does not need to take, and at the same time is using up energy and suffering needless discomfort. In fact, I can suggest no needed improvement on this check, as it locks the wheels absolutely, and still requires no more strength to operate it.

Recently I rode 250 miles in three days, and finished with 80 miles, the last 30 over the worst sandy roads I have ever ridden on, and with three in the machine, without any sense of fatigue in my right wrist or arm. Everyone who tries my machine expresses surprise that there is such a satisfactory method of steering, and asks why it is not in general use. The reason as I see it is that the check is made by a large manufacturing concern who do not find it a desirable business to put checks on individual machines of a large variety of makes. They would make the checks for any automobile maker who would order in quantity. I am in hopes that at least one maker of prominence will soon put these checks on.

I am aware that at present most any attractive machine with a fair showing of power will sell, and the makers are not obliged to do everything as well as they know how. I am also convinced that few makers have looked into this check very carefully, because they did not need to as long as the customers would take anything they put out.

I hope to see enough demand from riders who want something better, but perhaps have not seen the right thing, to force builders to furnish a safe and comfortable steering appliance for light and medium weight automobiles.

I wish to say in closing that I have no personal interest in this check, but I have a great interest in doing anything to help introduce a device of such merit and which might prevent so many serious accidents.

W. H. CHASE.

Automobiles in the Parks—Judged Authorities.

Editor HORSELESS AGE:

During the evening of Friday, June 18, C. M. Hanna was driving through River-view Park, in Allegheny City, Pa., when in making a turn he noticed a two horse pleasure vehicle in the distance, and shut off his power as he was going down hill. As the vehicles got closer together the horse on the far side of him became restless and Mr. Hanna brought his machine, a gasoline runabout, to practically a standstill. About

this time the outside trace on the restless horse became loose and battering against its leg helped to increase its agitation. It pulled the rig around suddenly and threw one of the occupants, a girl, out onto the dirt road. At the beginning of the excitement the driver jumped from his seat, leaving go of the reins. The girl was not hurt seriously, but all were badly frightened. Mr. Hanna assisted in carrying the girl to a safe place and called a doctor. He did all in his power to quiet the other members of the party, some of whom were on the verge of hysteria.

In the following day's newspapers an article appeared stating that such an accident had occurred and had been caused by the driver turning on the steam in his machine as he passed the horses; that he had immediately increased his speed and disappeared, and that it was good that he did so, as the bystanders were in a mood to lynch him, etc. The driver who deserted his team was not censured.

Following this there was a great deal of condemnation poured upon the heads of all automobile drivers, and on the following Thursday morning the morning newspapers contained the notice that the Director of Public Works of Allegheny had determined that he would no longer allow automobiles in the parks and an explanation that in certain parks in Chicago they were shut out and he had noticed the happy looks on the faces of the visitors to these parks. He also called attention to the very dangerous character of the automobile. During the next twenty-four hours the director evidently consulted an attorney, for in the following morning papers was a notice that he had withdrawn his previous "order," but would allow no fast driving in the parks.

The writer has driven through this park and could assure the director that no person who drives an automobile is foolish enough to attempt to drive over those serpentine roads at more than 4 or 5 miles an hour. Were the authorities of this as well as other cities to enforce all ordinances as rigorously as they are trying to do with the automobile ordinances, what ideal cities we would have. How many persons hire strange livery horses who are incapable of driving even a dray horse! Ninety per cent. of the pleasure rigs are in charge of persons who would be considered by a mine foreman unfit to drive a pit mule. Many of them do not know the right from the left side of the road. Still these are allowed to take a horse with a three minute record upon the streets without a protest. It's a very poor plug that cannot go a mile in three minutes, and this is at the rate of 20 miles an hour, and a horse at that gait will run another quarter of a mile before he can be stopped, but the automobile can be stopped within 50 feet, or even less. The speed races in France have given the general public the idea that all automobiles can run 50 to 80 miles an hour and are of 40 to 90 horse power, while the average

machine is from 4 to 16 horse power, with a maximum speed of about 35 miles on the choicest roads. Over ordinary bumpy streets, as we usually see, no person can keep his seat and run over 10 or 12 miles an hour in daytime. Why the authorities persist in unreasonable legislation is unexplainable. The automobile does not cut up the streets, does not dirty the street with droppings. It never shies and tramples people, and it takes up only half the space of a horse and wagon on the crowded streets. Is it ignorance, prejudice, or "the dog in the manger"?

A Wall from California.

Editor HORSELESS AGE:

My first year's experience running, selling and repairing automobiles has confirmed my faith in the gasoline class. Most of the troubles encountered are with the mixture or carburetors and water or gaskets. Most rigs have not sufficient radiating surface to prevent overheating, water boiling into steam, escaping and ultimately burning out of gasket. Ignition gives very little trouble. The proper mixture seems to be a hard problem for the ordinary learner to compass. The spark gap if covered is a great help, but possibly dangerous if exposed.

Most autos are geared too high on the high speed for California country roads. You have very few such grades as we, yet the manufacturer expects us to accept machines "as are," while if we could get them with two or three more teeth in the rear sprocket they would climb 6 or 8 per cent. grades on high speed. We realize this necessitates a larger differential sprocket case, but it pays to please a customer, and we take it for granted that California trade is worth pleasing.

Too many bolts break and show the cheapest kind of iron. Steel is cheap and automobile manufacturers might profit by bicycle experiences and adopt the rule that nothing in the material line is too good. Time develops the fact that wood wheels are not going to "stand up" as well as expected, not nearly as well as buggy and wagon wheels. Speed and vibration have their effects, which cannot be remedied by tightening up as with wire wheels.

In the matter of replacements under guarantee, we have failed to find any firm to "make good." Then, too, their charges for parts in some cases are outrageous and again ridiculously small. It seems sort of a hit and miss proposition, and the dealer usually gets hit. The local dealer is a large factor in popularizing any auto in his vicinity, yet he is hardly recognized by the manufacturer. The time will come when this will be changed.

It does us little good to "kick," as it loses its force by the time it reaches the factory 2,000 or 3,000 miles away. We dealers have an idea that California does not get the pick of machines, for if anything goes wrong, of course it is too far to ship anything back, so we have to do the best we can, and we often hear the remark that "this machine is much better now than when I got it from you."

E. S. L.

Steering Checks.

Editor HORSELESS AGE:

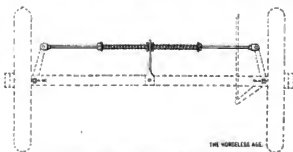
Noticing an inquiry of E. M. Carr for a steering check for side steering autos in your June 17 issue, I enclose you herewith a blue print of a check or centralizer which has been recently patented. It is in successful use in nine Knox machines in my city, and makes country riding a pleasure, as the swerving is practically eliminated.

H. W. GARLAND.

Spark Gap Query.

Editor HORSELESS AGE:

I have been trying to use a spark gap on my gasoline car, but it has not worked



GARLAND'S FORM OF STEERING CHECK.

satisfactorily. The points of the gap are enclosed in a glass tube. As long as they were thus enclosed I had difficulty in making the current pass over the gap, but I have recently removed the glass tube and I find that the gap works a great deal better.

Could you please tell me through the columns of your esteemed paper whether all spark gaps or intensifiers work better with the points open to the air instead of being closed? I have heard it asserted that as soon as the air within the tube or compartment through which the spark jumps becomes warm the spark will refuse to jump. Any information you could give me on this subject would be greatly appreciated.

WALLACE CANFIELD.

[We know of no theoretical reason why the spark should not pass as readily in warm air as in cold, unless the gap was hermetically inclosed and the heating greatly increased the pressure around the gap above atmospheric, but all the enclosed gaps we have seen were not enclosed so tight that the air pressure around them could differ greatly from atmospheric pres-

sure. It would be interesting to learn if others of our readers have been bothered the same way.—Ed.]

American Cars Wanted in India.

INHOW, Central India, May 27.

Editor HORSELESS AGE:

I shall be obliged if you would recommend good merchants and manufacturers of motor cars who will forward to me their price lists, estimates and specifications for supplying the following motor cars:

Two motor omnibuses, capable of carrying fourteen passengers and 800 pounds of luggage, with a speed of 12 miles an hour, and the gross weight of the car with passengers, luggage, etc., not to exceed 3 tons.

Three motor cars capable of carrying six passengers and 800 pounds of luggage, with a speed of 20 miles an hour.

I want one omnibus and two light cars in India by September, if possible, and the rest may be supplied subsequently. These machines are to be used all the year around and in all kinds of weather for carrying passengers and mails on metalled road which is rough and uneven and quite hilly. The journey is 40 miles long. It is difficult to obtain any other fuel than kerosene oil (in bulk), coal and firewood, hence kindly select suitable machines.

R. S. D. PATEL,

Landlord, Inhow, C. I.

The Restricted Property Question Again.

Editor HORSELESS AGE:

I want to build an auto house for my steamer, but our property has restrictions prohibiting any other building on the lots. Of course I can make an "addition to the house" without trouble, but this adds 100 per cent. to the insurance rate. Are the portable houses, such as I see advertised, within the restriction any more than a tent would be? Would such a house become the property of the owner of the property if it was put there by a tenant who wished to remove it at the end of the lease? How far should the house be from the dwelling to be within insurance demands in case gasoline is used? If kerosene is burned are above conditions changed? An answer to above will probably interest many who are in the same boat with

G. E. PANCRAS.

[When these restrictions were made such things as portable automobile houses were probably not thought of, and so far as we know no judicial opinion has yet been given on the point in question. Evidently only permanent buildings were considered when the restrictions were drawn and it seems logical that these would not affect portable houses. The owner of the property could certainly not lay claim to a portable house at the end of the term of lease.

When kerosene is burned and no gasoline used the insurance rate is not af-

fected by an automobile. The underwriters in New York city have no regular rule as to the distance a store of gasoline must be from a house in order not to influence its insurance rate; each case is investigated separately.—Ed.]

Information on Touring Routes Wanted.

JAMESTOWN, R. I., June 26.

Editor HORSELESS AGE:

I would like to ask whether you can give me any information as to the relative suitability of the Catskills, Green Mountains and White Mountains for automobile touring. Perhaps the number of tours reported to you would be some indication of the comparative popularity of the sections mentioned. I made a trip through the Berkshires last year and now want something new. If you have no information at hand, I would consider it a favor if you would put me in correspondence with someone who has done considerable touring through the country mentioned.

EDW. MALLINCKBOUT.

[If any of our readers have toured any of these sections they will confer a favor by communicating their experience with regard to the suitability of these parts and their facilities for touring. We do not believe that the Catskills have yet been toured with automobiles. All of these sections will eventually be dealt with by Mr. Gillette in the series on "Touring in America."—Ed.]

Performance of an Internal Combustion Engine Using Kerosene and Gasoline as Fuel.

(Abstract of a paper, by B. F. Halladay and G. O. Hodge read at the June meeting of the American Society of Mechanical Engineers.)

This paper is the outgrowth of a series of investigations made in the mechanical engineering laboratory of the Thomas S. Clarkson Memorial School of Technology. Their object was to determine the economic performance of a standard internal combustion engine of the Otto type using kerosene and gasoline respectively as fuel under otherwise similar conditions.

There is necessarily a fixed brake horse power limit for each kind of fuel used in an internal combustion engine. The engine tested was nominally rated to deliver 15 horse power at 260 revolutions per minute. Under test the maximum limit of power delivery was: By gasoline, 14.91

horse power at 267.4 revolutions; and for kerosene, 17.41 horse power at 309 revolutions. That is to say, this engine was found to be capable of developing 16.8 per cent. more power with kerosene than with gasoline.

Accompanying the increased capacity of the engine with kerosene it was also found that it could be operated with this fuel at better efficiency and fuel economy at all loads above about 40 per cent. of the normal full load. The cost of the fuel when the tests were made was 14 cents per gallon for kerosene and 14½ cents for gasoline. The heating values of the fuels by Mahler bomb calorimeter tests were 19,282 British thermal units per pound for the kerosene and 20,296 British thermal units for the gasoline, averages from four tests each.

The tests with gasoline were made with the apparatus as supplied by the builders when purchased. The tests with kerosene required special attachments, adjustments and methods, which it is one of the objects of this paper to describe. A great deal of experimenting was necessary before the engine could be successfully operated with kerosene, but the work was finally carried out with entire success.

In order to use kerosene oil in the engine it must be sprayed into a heated chamber, where it is vaporized and the vapor superheated. By an internal air jet the kerosene may be broken up into a fine spray or mist, which at the same time may serve to carburize the air used to atomize the oil. The kerosene-air mixture must then be thoroughly vaporized by an external source of heat. It is further necessary to preheat this mixture sufficiently to prevent condensation of the vaporized oil upon its entering the cooler gas ports and passages of the engine.

Special attachments to effect the above changes in the kerosene were designed by the authors. The superheating and vaporizing chamber is attached to the cylinder, and at the outer end of this chamber is the atomizer, with needle throttle valve, shown in detail in Fig. 1.

The atomizing arrangement consists of a small brass cylinder 4 inches long fitted with two needle valves, 2 and 3. Fig. 1. These control respectively the flow of kerosene oil and the supply of compressed air from pipes a and b. The spindles of the needle valves were fitted with pointer and graduated index plates for mutual adjustment of compressed air and kerosene oil to the desired degree of refinement, with-

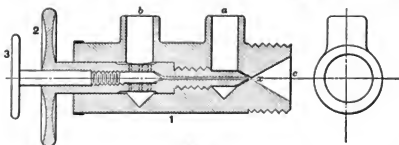


FIG. 1.

TABLE I.—DISTRIBUTION OF THE TOTAL HEAT SUPPLIED BY THE KEROSENE.

(In Per Cents.)

NUMBER OF TEST.	Total supplied per hour. (H. T. U.)	Absorbed by jacket.	Lost by exhaust and radiation.	Lost by friction.	Converted into useful work.	Indicated work.
1	194,143	36.30	42.84	2.76	18.10	20.85
2	195,833	38.69	39.41	3.61	19.10	21.98
3	169,341	34.35	46.56	2.02	16.60	19.77
4	115,692	43.70	32.17	4.44	19.60	24.11
5	182,536	21.42	58.74	2.06	18.00	19.86
6	190,770	41.00	33.38	4.65	20.19	24.69
7	199,248	29.78	32.27	1.57	16.90	18.01
8	260,912	29.10	51.53	1.49	18.18	17.98
9	69,415	35.67	38.40	8.72	7.81	15.67
10	96,410	44.85	35.49	5.96	13.70	19.57

out loss in quantity of oil or change in its chemical composition.

The compressed air, entering through pipe *b*, passes through the fine perforations in needle valve *2*, thence through its very small bore *x*, emerging from which it sprays the kerosene oil supplied through pipe *a*. The result is the formation at the conical orifice *c* of an exceedingly fine spray of kerosene-air mixture which thence enters the vaporizer.

The vaporizer and superheater consists of a closed wrought iron pipe, 2 feet long and 5 inches diameter. It is heated by a number of Bunsen burners placed beneath, and heat insulated and protected from drafts by asbestos sheets. The temperature of the superheated kerosene-air mixture was continuously observed. It was kept within the range of 590° to 670° Fahr. At a lower temperature than 575° Fahr. the vapor would be at once condensed in the admission passages. The temperature of

TABLE II.—SUMMARY OF DETERMINATION OF HEATING VALUES AND CHEMICAL ANALYSIS OF KEROSENE AND GASOLINE FUELS.

	KEROSENE.	GASOLINE.
Specific gravity, Baumé.....	49.1°	70°
Flash test.....	118° F.	.....
Fire test.....	153° F.	.....
Commercial name.....	"Water white oil."	"Stove gasoline."
Cost per gallon on day of test.....	\$0.14	\$0.145
HEATING VALUE.		
Samples: No. 1, B. T. U.....	19,000	20,200
" " 2, " ".....	18,100	19,700
" " 3, " ".....	20,010	20,400
" " 4, " ".....	19,300	19,750
Average heating value, B. T. U. per pound fuel.....	19,200	20,200
ULTIMATE ANALYSIS.		
Carbon.....	84.13	83.53
Hydrogen.....	13.97	14.14
Sulphur.....	.....	.59
Nitrogen.....	1.77	1.93
Oxygen.....	.....	99.69
Asb.....	.....	.31
	100.00	100.00

vaporization of the kerosene oil was about 380° Fahr., so that the degree of superheat was about 240° Fahr. The fuel was fed under an air pressure of 30 to 40 pounds per square inch.

With the superheated kerosene-air mixture there is very quick explosion. It is evident from the pounding noticeable in the engine, which could not be attributed to any other cause; such as pre-ignitions, or too high a temperature of the working gas, or soot on the cylinder walls. This pounding could not be done away with except by changing the point of ignition, and such a change would be at the expense of the efficiency. A comparison of the explosive nature of the kerosene and gasoline gases may be made from the indicator cards obtained. One card of the kerosene series shows

a maximum pressure of 404 pounds, and a card of the gasoline series shows a maximum pressure of 309 pounds, while the mean effective pressures are almost the same, 85.65 and 86.40 pounds respectively.

Chemical analyses of the fuels were made to determine their heating value. In the case of gasoline the carbon found was 83.53 per cent., the hydrogen, 14.14 per cent. Using Dulong's formula for heating value of a hydrocarbon, we obtain 20,947 British thermal units, this being but slightly different from the result obtained in the calorimeter, 20,276 British thermal units; thus,

$$83.53 \times 14,500 + .1414 \times 62,500 = 20,947$$

B. T. U.

From the chemical analysis of the kerosene the per cent. of carbon and hydrogen were respectively 84.13 and 13.87. Using

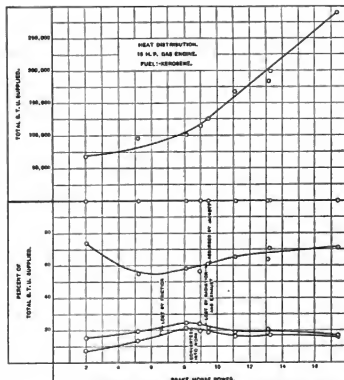
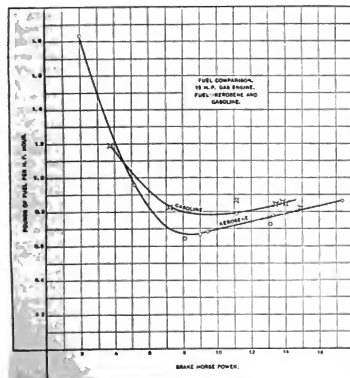


TABLE III.—EXHAUST GAS TEMPERATURE AND ANALYSIS.

	KEROSENE.				GASOLINE.				KEROSENE.				GASOLINE.			
	Degree super-heat of vapor. $^{\circ}$ F.	Temperature exhaust gases $^{\circ}$ F.	B. H. P. delivered.	Corres. ponding Per cent. full load.	Temperature exhaust gases $^{\circ}$ F.	B. H. P. delivered.	Corres. ponding Per cent. full load.		Exhaust gases.				Exhaust gases.			
									CO ₂	O	CO		CO ₂	O	CO	
Maximum.....	290	914	17.41	100.0	800	14.91	100.0	11.6	15.7	1.3			9.3	16		1.8
Minimum.....	210	478	11.76	69.0	211	8.75	45.	1.7	8	0.0			3.4	8		0.9
Average.....	248	708			770			5.6	12.6	.5			5.7	9.9		1.06

the above formula, the following heating value was obtained:

$$0.8413 \times 14,500 + 0.1387 \times 62,500 = 20,860 \text{ B. T. U.}$$

FUEL CONSUMPTION.

The minimum consumption or best economic load of the engine occurs at 11 brake horse power for kerosene and at 12 brake horse power for gasoline; that is, for kerosene at about 63 per cent. of the maximum full load for that fuel, and for gasoline at 80 per cent. of the maximum full load for this fuel. Under very light loads the gasoline is the more economic fuel, as noted by the intersection of the economy curves, at about 6.2 brake horse power. The kerosene proved to be the better fuel for heavy loads in the given engine, not only in point of economy but also in matter of speed, as elsewhere noted.

The maximum thermal efficiency of 19.2 per cent. for kerosene was reached much earlier in the range of loads than for the gasoline; thence it decreases rapidly to 13.18 per cent. at the maximum full load. With the gasoline, on the other hand, there seems to be a tendency for the efficiency to

remain at about the same value of 14.9 per cent. after attaining this maximum.

The best economic loads for the engine varied with each fuel, being 8 brake horse power for kerosene and 9.5 brake horse power for the gasoline; that is, for kerosene at about 46 per cent. and for gasoline at about 63 per cent. of the maximum full loads for these fuels respectively.

The rate of consumption was the same for each fuel at about 4.5 brake horse power delivered; under light loads gasoline was the more economic fuel, while kerosene proved to be the better fuel for high duty heavy load work.

The Latest Manchester Motor Fire Engine.

By ALBERT L. CLEGG.

The self propelled steam fire engine which has just been shipped by the Manchester, N. H., branch of the American Locomotive Company to the Portland, Me., Fire Department is the largest portable steam fire engine ever constructed. The manufacture of these engines by the Manchester works dates back to the 60's, when almost

nothing was known about self propelled vehicles, but it is a remarkable fact that the engines constructed at that very early date were thoroughly practical, not only as motor vehicles but as fire fighting machines.

The use of the differential gear as applied to motor vehicles was unknown to the builders of the first engines of this type and the earliest machine was constructed without means for providing a different speed for the two driving wheels in rounding corners. This naturally prevented its successful use, and a form of differential gear was adopted. This is thought to have been the first application of this principle to a successful motor vehicle.

The self propelled engine just constructed is 16 feet over all in length, tracks 65 inches and has a wheel base of about 12 feet. The driving wheels are exceedingly massive, with cast hubs and wooden spokes and rims. The rear wheels are 60 inches in diameter, the front ones 48 inches in diameter. The tires for the rear wheels are $4\frac{1}{2}$ inches wide and $1\frac{1}{8}$ inches thick, while those for the front wheels have a width of 4 inches and the same thickness. Outside of these tires, which hold the wheels together, are the driving tires of a thickness of one-half inch. These tires are made in halves and bolted onto the main tires. The driving tires carry a large number of protuberant driving pins set in inclined lines across the tire and having the form of truncated cones. These driving pegs are riveted into the driving tire. The springs in the rear are semi-elliptic and exceedingly massive, and a three point or platform spring of the Endicott type supports the forward axle. Steering is effected by means of a very large hand wheel with wood encased rim, which drives a vertical steering column, communicating its motion by bevel gears to a worm shaft which engages a circular rack and effects the motion of the whole front axle. The boiler is 40 inches in diameter and contains 313 copper tubes of $1\frac{1}{4}$ inches diameter and 24 inches long. The height of the boiler is 72 inches. The fire box is of larger diameter than the boiler, in order to secure the requisite heating surface, and the grate has a diameter of 47 inches. The engines, of which there are two, are of the vertical double acting type set 90 degrees apart, and drive two double acting plunger pumps of $5\frac{1}{4}$ inches diameter. The steam cylinders are of $9\frac{1}{2}$ inches diameter and the stroke is 8 inches. The capacity of these pumps is 1,500 gallons per minute for a short trial, or 1,350 gallons per minute guaranteed steady output. In a recent trial this engine threw a $1\frac{1}{4}$ inch stream 352 feet through 100 feet of hose and a 2 inch stream 319 feet.

The engines are controlled by means of a throttle, which may be operated either by a hand wheel from the engineer's pumping position, or by a hand wheel and bevel gearing from the engineer's driving position, which is in the rear of the boiler on a platform. The link reversing gear has only two positions besides the neutral, and is



MANCHESTER MOTOR FIRE ENGINE—LARGEST IN THE WORLD.

operated by an ordinary reverse lever and quadrant in easy reach of the engineer's driving position. The transmission is by means of a spur gear upon the engine shaft which engages with a larger gear on a transverse countershaft between the engines and the boiler. This countershaft carries the differential gear near its right hand end and runs in four heavy plain bearings. Sprockets and specially constructed, carefully pitched chain convey the power to large sprockets forming parts of the rear wheel hubs. Each link of the chain is specially formed over a former to exactly fit the sprocket teeth and eliminate all possibility of climbing on the part of the chain. While the engine is in operation driving to a fire the pumps are constantly in motion, but absorb no energy on account of valves in the pumps being opened which communicate with the outside air. The connection of the engine to the driving mechanism is by means of a specially constructed removable key, which is withdrawn when the fire is reached, and may be entirely removed so as to make impossible the starting of the vehicle until it is desired. This key is specially massive and there is special means of holding it in place when the engine is on the road.

The weight of the entire machine is 17,500 pounds without water. The water supply tank holds 111 gallons and the boiler 60 gallons, and the vehicle can run 5 miles over average roads without supplies. Its speed is nearly 15 miles per hour, and the speed reduction from the engine to the countershaft is about 7 to 1, while the reduction by sprocket ratio is about 5 to 1.

In operating the engine on the road the steersman is seated in the usual position and in control of the steering gear, and a gong signal operated by his foot communicates with the engineer on the platform at the rear by means of the usual code of steamboat signals. The engineer in his position has full control of the motive power. No brakes are provided, and the speed control is effected entirely by the throttle and reverse lever. Despite its great weight the engine climbs the steepest hills which are encountered in city use with the greatest ease, and has an abundance of tractive power upon dirt roads, asphalt or pavements under all conditions.

Trade Literature Received.

The American Ball Bearing Company, Cleveland, Ohio.—A catalogue of machines using the "American" ball bearings.

New York Dash and Fender Company, 125 East Forty-second street, New York city.—Pamphlet containing a reprint of the Bailey law.

Albion Engine and Motor Company, of Albion, Mich.—Catalogue of Miller stationary gasoline engines.

K. L. Ryman Company, of Newark, N. J.—Catalogue of automobile and carriage springs manufactured by Daniel Delany & Son, Newark, N. J.

OUR FOREIGN EXCHANGES



The German Automobile Association will hold its annual meeting in the Rathausaal, Munich, on July 5.

Lord Charles Beresford, commander-in-chief of the British Channel fleet, will take an automobile aboard when going to sea again, to use at places where the fleet may call.

It is rumored that the Ladies' Automobile Club, of London, has ceased to exist and that the premises at 110 Piccadilly, where the club was to be installed, are offered for rent.

The technical committee of the A. C. F. at its last meeting decided to open the competition of "carburetors" on July 15 and the commercial vehicle contest on the first Monday in October.

In the principality of Montenegro, in which there is not a foot of railroad, a motor omnibus has just been put in service between Cattaro and Cetigne, over a magnificent road built by an Austrian engineer, Herr Slade, some twenty years ago.

The *Motor Cycle* says an excellent means to preserve the elasticity of motor cycle tire covers, especially in hot weather, is to rub them with a piece of soft linen which has been dipped in water, to which a weak solution of ordinary washing soda has been added.

The Circuit des Ardennes race was run after all, and was won by De Crawler in 5:52.07 3-5, or just a little better time than that made by Jarrot last year. Jarrot and Vanderbilt did not complete the race. Girardot once more confirmed his claim to the title of "the eternal second."

The committee of the Corinthian Club, of Dublin, have issued invitations to all the competitors, whom it is proposed to entertain at the Dolphin Hotel, Dublin, on the 27th inst. Acceptances have been received from all except the Germans, who may not arrive in Ireland until the 28th inst.

A company engaged in felling trees at Wygoda, in Galicia, is employing motor wagons to carry both the wood when cut into logs, and entire trees. These timber wagons were manufactured by the Vienna Neustadt Daimler Motor Company. While the transport of ready cut logs presents no difficulties, it is not the same case with whole trees, which often measure over 50 feet in length, being longer than the car it-

self. Use is made therefore of a second light car with only two wheels.

During the month of May 570 automobiles and motor cycles were imported into British ports valued at \$803,645.

The English Motor Cycling Club will shortly hold a series of fifty miles non-stop trials, open to members only, for medals.

At the annual meeting of the Institution of Civil Engineers, which began at London on June 17, a paper was read by M. E. Sauvage on "The Use of Petrol Motors for Locomotion" and another by Col. R. E. B. Crompton on "Application of Electricity to Driving Carriages in Town."

The Austrian army during the coming manœuvres will make extensive use of motor bicycles. The soldiers will have to keep the machines in repair themselves, and to this end a number of them are at present being trained at the factories. All Austrian motor cycle factories will furnish machines.

A bill has been introduced in the French Chamber of Deputies by M. Conti which fixes a fine for the first offense of driving at excessive speed, and imprisonment for a repetition of the offense within a year. Mayors are allowed to fix the maximum speed at 12 kilometres in towns and 20 in the country. Posts will be erected indicating the speed permitted.

In a recent United States patent Robert A. Hatfield, of Sheffield, England, describes a process of toughening manganese steel, which consists in slowly heating the steel to a temperature from about 750° to about 800° Centigrade, and then raising the temperature rapidly to from 940° to 1,125° Centigrade, and finally plunging the highly heated steel in cold water.

M. Loubet, the French President, has appointed an extra parliamentary committee to examine into all questions relative to the circulation of automobiles. This committee comprises five senators, eleven deputies, one councillor of state, and a large number of engineers, journalists, automobile manufacturers and members of the Automobile Club of France.

A plow driven by an alcohol motor has for some time been in use on the Schildberg estate near Sölden, Germany, where it replaced a steam plow formerly used. The report, which seems to have originated with the manufacturers of the new plow, states that "the unequalled uniform draft of the alcohol motor resulted in greatly superior work; the plowed surface was so smooth that one might have thought it had been harrowed already."



Massachusetts State Law.

Following is the complete text of the new Massachusetts State law (House Bill No. 1,560), which went into effect on Wednesday, June 4:

SEC. 1.—REGISTRATION.

All automobiles and motor cycles shall be registered by the owner or person in control thereof in accordance with the provisions of this act. Application for such registration may be made, by mail or otherwise, to the Massachusetts Highway Commission or any agent thereof designated for this purpose, upon blanks prepared under its authority. The application shall, in addition to such other particulars as may be required by said commission, contain a statement of the name, place of residence and address of the applicant, with a brief description of the automobile or motor cycle, including the name of the maker, the number, if any, affixed by the maker, the character of the motor power, and the amount of such motor power stated in figures of horse power; and with such application shall be deposited a registration fee of \$2. The said commission or its duly authorized agent shall then register, in a book to be kept for the purpose, the automobile or motor cycle described in the application, giving to such automobile or motor cycle a distinguishing number or other mark, and shall thereupon issue to the applicant a certificate of registration. Said certificate shall contain the name, place of residence and address of the applicant and the registered number or mark, shall prescribe the manner in which said registered number or mark shall be inscribed or displayed upon the automobile or motor cycle, and shall be in such form and contain such further provisions as the commission may determine. A proper record of all applications and of all certificates issued shall be kept by the commission at its main office, and shall be open to the inspection of any person during reasonable business hours. The certificate of registration shall always be carried in some easily accessible place in the automobile or motor cycle described therein.

Upon the sale of any automobile or motor cycle, its registration shall expire, and the vendor shall immediately return the certificate of registration to the highway commission, with notice of the sale, and of the name, place of residence and address of the vendee.

SEC. 2.—DEALERS' LICENSE.

Every manufacturer or dealer in automobiles or motor cycles may, instead of registering each automobile or motor cycle owned or controlled by him, make appli-

cation upon a blank provided by said commission for a general distinguishing number or mark, and said commission may, if satisfied of the facts stated in said application, grant said application, and issue to the applicant a certificate of registration containing the name, place of residence and address of the applicant, the general distinguishing number or mark assigned to him, and made in such form and containing such further provisions as said commission may determine; and all automobiles and motor cycles owned or controlled by such manufacturer or dealer shall, until sold or let for hire or loaned for a period of more than five successive days, be regarded as registered under such general distinguishing number or mark. The fee for every such license shall be \$10.

SEC. 3.—IDENTIFICATION NUMBERS.

Except as otherwise provided herein, no automobile or motor cycle shall, after the 1st day of September in the year 1903, be operated upon any public highway or private way laid out under authority of statute, unless registered as above provided, and the registered number or mark of every automobile and motor cycle operated as aforesaid shall at all times plainly be displayed thereon in Arabic numerals not less than 4 inches long, and conforming in this and other details to the requirements prescribed by the highway commission in its certificate of registration.

SEC. 4.—OPERATORS' LICENSE.

Licenses for operating automobiles and motor cycles shall be issued by the Massachusetts Highway Commission or duly authorized agents thereof. Application shall be made upon blanks prepared by the commission for this purpose, and the licenses issued shall be in such form and shall contain such provisions as said commission may determine. To each licensee shall be assigned some distinguishing number or mark, and a proper record of all applications for license and of all licenses issued shall be kept by the commission at its main office, and shall be open to the inspection of any person during reasonable business hours. Each license shall state the name, place of residence and address of the licensee and the distinguishing number or mark assigned to him.

Special licenses for operating automobiles or motor cycles for hire shall be issued by the commission, but no such license shall be issued until the commission or its authorized agent shall have satisfied itself or himself that the applicant is a proper person to receive it. Such licenses shall be granted for one year only.

The fee for each license to operate shall be \$2. All fees shall be deposited at the time of making the application. The commission may at any time suspend or revoke any license for any misconduct of the licensee. Before a license to operate is granted the applicant shall pass such examination as to his qualifications as may be required by the State Highway Commission.

SEC. 5.—VEHICLES FOR HIRE.

Except as hereinafter provided, no person shall, on or after the 1st day of September in the year 1903, operate an automobile or motor cycle upon any public highway or private way laid out under authority of statute, unless licensed so to do under the provisions of this act. No person shall operate an automobile or motor cycle for hire, unless specially licensed by the commission so to do. No person shall employ for hire as chauffeur or operator of an automobile or motor cycle any person not specially licensed as aforesaid, and every chauffeur or operator for hire shall, while so acting, display the distinguishing number or mark assigned to him, in such manner as may be prescribed by the commission.

SEC. 6.—EXEMPTION OF DRIVERS LICENSED ELSEWHERE.

Automobiles or motor cycles owned by non-residents of this State and driven by a person residing and licensed in some other State may be operated on the roads and highways of this State, subject, however, to the speed limitations contained in Section 4, and to any local regulations permitted under Section 8, and to such further regulations as the highway commission may make. The provisions of this section shall not prevent the operating of automobiles by unlicensed persons if riding with or accompanied by a licensed chauffeur or operator.

SEC. 7.—CONDUCT ON MEETING HORSES.

Every person having control or charge of an automobile or motor cycle shall, whenever upon any public street or way and approaching any vehicle drawn by a horse or horses, or any horse upon which any person is riding, operate, manage and control such automobile or motor cycle in such manner as to exercise every reasonable precaution to prevent the frightening of such horse or horses, and to insure the safety and protection of any person riding or driving the same. And if such horse or horses appear to be frightened, the person in control of such automobile or motor cycle shall reduce its speed, and if requested by signal or otherwise by the rider or driver of such horse or horses, shall not proceed farther toward such animal unless such movement be necessary to avoid accident or injury, or until such animal appears to be under the control of its rider or driver, and in case of extreme fright shall reduce the motive power to a full stop.

SEC. 8.—SPEED LIMIT.

No automobile or motor cycle shall be run on any public way or private way laid out under the authority or statute outside the limits of a city or the thickly settled or business part of a town or fire district at a speed exceeding 15 miles an hour, or within a city or the thickly settled or business part of a town or fire district at a speed exceeding 10 miles an hour. Upon approaching a crossing of intersecting ways, also in traversing a crossing or in-

tersection, and in going around a corner or a curve in the highway. Every person operating an automobile or motor cycle shall run it at a rate of speed less than that heretofore specified and at no time greater than is reasonable and proper, having regard to traffic and the use of the way and the safety of the public, and in no event exceeding 8 miles an hour.

SEC. 9.—PENALTIES.

The commission may, after due hearing, suspend or revoke a certificate issued under Section 1 of this act, or the license issued to any person under Section 3 of this act, for any cause which it may deem sufficient; and any person convicted of violating any provision of this act shall be punished by a fine not exceeding \$25 for a first offense, and not exceeding \$50 for second and subsequent offenses. Any person convicted of operating or causing or permitting any other person to operate an automobile or motor cycle after a revocation or suspension of the certificate or license granted under this act for such vehicle shall be punished by a fine not exceeding \$100, or by imprisonment for a term of ten days, or by both such fine and imprisonment.

SEC. 10.—EQUIPMENT.

Every automobile or motor cycle operated in this Commonwealth shall be provided with an adequate brake, with a muffler, and with a suitable bell, horn or other means of signaling, and shall, during the period from one hour after sunset to one hour before sunrise, display lights, with the registered number or mark thereon, of such size as may be prescribed by the highway commission.

SEC. 11.—LOCKING OF CARS LEFT IN STREET.

Every automobile or motor cycle shall be provided with a lock, key or other device to prevent said vehicle from being set in motion, and no person shall allow any such vehicle operated by him to stand or remain unattended in any street, avenue, road, alley, highway, park, parkway or other public place without first locking, fastening or fixing the vehicle as above provided.

SEC. 12.—FEES AND EXPENSES.

The fees received under the provisions of this act shall be paid monthly by the secretary of the highway commission into the treasury of the Commonwealth; and such expenses as may be necessary in carrying out the provisions of this act shall be paid out of the treasury of the Commonwealth.

SEC. 13.—DEFINITION OF TERMS.

The terms automobile and motor cycle as used in this act shall include all vehicles propelled by power other than muscular power, excepting railroad and railway cars and motor vehicles running only upon rails or tracks, and steam road rollers.

SEC. 14.—LOCAL OPTION AND APPEALS.

Nothing herein contained shall be so construed as to affect the rights of boards of park commissioners as authorized by

law. Boards of aldermen of cities and the selectmen of towns may make special regulations as to the speed of automobiles and motor cycles, and as to the use of such vehicles upon particular roads or ways, including the right to exclude them altogether therefrom. Such exclusion, however, shall be subject to an appeal to the Massachusetts Highway Commission, whose decision in the case shall be final. No such special regulation shall be effective unless notice of the same is posted conspicuously at the points where any road affected thereby joins other roads.

SEC. 15.—REPEAL OF OLD LAW.

Chapter 315 of the acts of the year 1902 is hereby repealed.

SEC. 16.—DATE OF GOING INTO EFFECT.

Except as otherwise provided herein, this act shall take effect upon its passage.

Mayor Jones has expressed his disapproval of a licensing and numbering ordinance now before the city council of Toledo.

The Chicago authorities promise that after July 1 they will rigorously enforce the 3½ inch initial provision of the local automobile law.

A crusade against the scorching automobilist is on in Grand Rapids, Mich. One arrest has been made and agitation for a numbering ordinance has commenced.

A. A. McKelvey, a well known New York automobilist, has been sued for \$1,000 damages by a farmer he is reported to have run into at New London, Conn.

The authorities of Louisville are waging war on all automobile users who persist in using horns instead of bells, contrary to the provisions of a local ordinance. Test cases are probable.

Frederick C. Havenmeyer has instituted suit against the city of New York for \$7,000—the value of an automobile which plunged into a sewer excavation on Hoffman boulevard, Long Island City, last November.

An ordinance regulating the use of automobiles is soon to be introduced in the city council of Louisville, Ky. The Louisville Automobile Club is preparing to make argument against any unfair provisions.

Horace Cornell, chauffeur for C. K. G. Billings, achieved the distinction of being the first victim of the Bailey law by running a Mors touring car in Central Park without number or initials. He was released on bail after his arrest.

The question of enacting an ordinance requiring operators of automobiles to pass an examination as to their fitness before the municipal board of engineers prior to certificates being issued to them, is being agitated by the Omaha (Neb.) city council.

George B. Adams, a New York city dealer, was arrested twice on June 25 for driving in Central Park without a license. He was released both times, as the Bailey law exempts dealers and manufacturers from the numbering requirement, except when running machines for private use. The National Association of Automobile

Manufacturers, through its counsel, Charles Thaddeus Terry, has instituted test cases to protect dealers running demonstrating machines from further annoyance. Mr. Adams' case will be fought on the ground of illegal arrest.

It is claimed that many automobilists of Lockport, N. Y., are violating the local ordinance prohibiting the storage of more than 5 gallons of gasoline within the city limits. A number of complaints have been registered by local property owners.

Only twelve municipal licenses have been taken out by the automobilists of Indianapolis, in accordance with the old "horseless carriage" ordinance of 1893. The city fathers threaten to raise the fee from \$3 to a sliding scale based on the weight or horse power of machines.

The demurrer of the city of Chicago to the bill filed by Albert C. Banker, asking that the city be restrained from causing the arrest of persons who have failed to comply with the local license ordinance, has been overruled. This leaves the injunction against the city still in force.

The trial of Charles W. Jones, of Randolph, Mass., against whom the grand jury found an indictment for manslaughter, for causing the death of Charles F. Porter, of Brockton, Mass., with an automobile, commenced June 17 at Plymouth. The accident occurred on March 26, 1903.

William Duffee, C. C. Moore and Joseph Baker are suing the city of Fall River, Mass., for \$3,000 damages, suffered through Mr. Duffee's automobile running into an unguarded drain ditch. As a retaliatory move, apparently, the board of aldermen are considering a plan for taxing automobiles.

Spencer Trask, of New York city, gave the Bowling Green Building, valued at \$1,000,000, as security for the appearance of his chauffeur, Clyde Adams, recently arrested for exceeding the speed limit. Adams declares the machine was going but 7½ miles an hour. Several other arrests were made in New York city the past week.

The automobile law recently passed by the Kansas Legislature went into effect June 21. Any owner who does not immediately provide himself with a license renders himself liable to a fine of from \$100 to \$1,000, or to a term of thirty days to six months in jail, or to both. License numbers must be displayed on the lamps of all machines, and 9 miles an hour is the maximum speed permitted.

Police Superintendent Brill, of Buffalo, N. Y., on June 18 sent an order to all police captains requiring them to take the names and addresses of all automobilists found operating a machine without a license. The purpose of the order is said to be to place the department in a position to know who has and who has not obeyed the Bailey law, but that the intention is to give all who have not obtained certificates a reasonable time to do so, and then prosecute all delinquents.



The Bode Automobile Company, of Chicago, Ill., are putting through 200 gasoline runabouts.

The Columbia Electric Company, of Chicago, has removed its garage to new quarters on Michigan avenue.

A program of automobile, motor cycle, bicycle and horse races is to be run at Electric Park, Baltimore, Md., July 4.

The Hydra Battery Company, of New York city, is placing several new styles of semi-dry batteries on the market.

It is reported that Charles J. Weldon, a carriage builder of Rockford, Ill., will soon enter upon the manufacture of electric automobiles.

The National Elevator and Machine Company, of Honesdale, Pa., is reported preparing to engage in the manufacture of automobiles.

Professor Pickering, of Harvard University, has ordered from the Duryea Power Company a six cylinder 30 horse power motor for aeronautical purposes, to weigh 200 pounds.

The Marble-Swift Automobile Company, 204 Aldine square, Chicago, Ill., are establishing themselves in a new factory having a floor space of 12,000 square feet, and are putting through 100 rigs.

The Jones-Corbin Company, Philadelphia, are shipping their first cars, and expect from now on to turn out three per week. They have raised the price of their runabout from \$1,000 to \$1,250.

The International Association of Machinists has been enjoined from even using "persuasion" in its strike against the National Motor and Vehicle Company, of Indianapolis. Trouble is expected.

Mr. and Mrs. William Huston, of Columbus, Ohio, have started upon a 3,000 mile tour through the East in a Toledo steamer. The trip is to last from the middle of June to the middle of October.

The Alden-Sampson Manufacturing Company, of Pittsfield, Mass., builders of the Moyea touring car, may move their plant to New York at an early date. Local business men are endeavoring to prevent the change by offering to subscribe to a stock company, the proposed capitalization being \$250,000.

The Locomobile Company state that although their four cylinder touring car engine is rated at only 16 horse power it develops in brake tests from 24 to 26 horse power, and no engine leaves the testing department which does not show at least 22 horse power. They report recent sales to A. T. Wing, G. E. McQuestion and R. C. Sheldon, of Boston, Mass.; W. B. E. Lockwood, of Norwalk, Conn.; A. K. Bona, of Winona, Minn.; E. D. Thayer, of Worcester, Mass.; W. R. Laughlin and

W. J. McCleary, of Philadelphia, Pa.; J. H. Warc, of Chicago.

The New York Edison Company announces the establishment of a charging station for electric automobiles at Yonkers, N. Y.

J. M. Edsall, formerly with Sidney Sheppard & Co., has been elected secretary of the E. R. Thomas Motor Company, of Buffalo.

Captain Croll, of Salt Lake City, Utah, is agitating for an automobile club in his city. Utah is said to be on the verge of an automobile boom.

Robert H. C. Brock, of Philadelphia, who started May 14 on an automobile tour to the Pacific Coast, has abandoned the trip on account of difficulties encountered west of Chicago.

Mrs. John C. Wright, of Lafayette, Ind., has paid \$2,000 for property on East Vermont street, in that city, supposedly to keep the Indiana Automobile Company from erecting a storage and repair station on the site.

A new garage and storage station has been opened in Salem, Mass., by the Automobile Company of Salem, organized by Clarence Pummam. Agency arrangements with the Orient and the Waverly companies have been effected.

The Manhattan Storage Company, recently opened at 40 and 44 Reade street, New York city, under the management of Samuel Wolfson, will deal in automobile supplies. A general repairing and second hand business is also to be undertaken.

Automobile exports from the United States for the month of May were valued at \$144,271, as compared with \$148,647 for the same period in 1902. The total value of automobile exports for the first five months of the year amounted to \$1,038,792.

In reply to the inquiry from F. Hiorth, Henri G. Ide informs us that the Hider Automobile Company, 248 Jefferson avenue, Detroit, Mich., have built a delivery wagon that moves 2 tons at 25 miles an hour, and are now designing a passenger vehicle to carry thirty to forty people at the same speed. This, he thinks, would suit Mr. Hiorth's requirements.

San Francisco is to have an up to date garage. Land has been purchased at the corner of Golden Gate avenue and Octavia street and a building will be erected at a cost of \$30,000, especially adapted to the business and having a capacity for over 300 machines. The appointments will include reception rooms, cafe and grill rooms, a machine shop, library, etc. The incorporated name is the Pacific Automobile Company, and among the capitalists interested are E. P. Brinagar, Harry D. Morton, George S. Nixon, Frank M. Lee, Henry C. Cutting, W. Arthur Stringer, Paul Seiler, Jesse S. Andrews, Reuben P. Hurlburt, J. N. Miller, J. D. Lee, Byron Jackson, J. M. Wilkins, W. S. Arnold, P. F. Rocket, G. W. Andrews, L. Eugene Lee. The following agencies will be represented: Winton,

Olds, Vehicle Equipment Company and the Locomobile.

The Sioux Falls Auto Coach Company, of Sioux Falls, S. D., has applied for articles of incorporation. Regular passenger service between Sioux Falls, Canton and Dell Rapids is proposed.

Burk Brothers, of Chattanooga, Tenn., are planning to erect a \$15,000 building at the corner of Tenth and Columbus streets, in that city, to be occupied by an automobile garage, club rooms and offices.

Twenty-seven entries in the three days' endurance run of the New York Motor Cycle Club had been received up to the time of closing, June 27. The run will take place on July 3, 4 and 5, between New York city and Worcester, Mass.

The Colorado Automobile Company, of Denver, entered a "General" runabout in the 100 mile endurance contest held there on Decoration Day, and won a first class certificate. The car lost only four points out of 425 and these owing to a broken battery connection.

The Brodie Electric Company, No. 92 West Central street, Manchester, N. H., have established a charging station for electric vehicles and also for the storage of cars of all kinds. They also maintain a machine shop with skilled machinists for the performance of repairs of every description.

The Packard Motor Car Company reports that E. T. Fitch and M. C. Krarup, who have undertaken to run a Packard automobile from San Francisco to New York city, have reached Wadsworth, Nev., in their progress eastward. This is the first time that an automobile has succeeded in crossing the Sierra Nevada Mountains.

Sixteen Chicago automobile dealers organized themselves into the Chicago Automobile Trade Association at a meeting held June 24. H. W. Jones, of the Electric Vehicle Company, was elected president; J. A. Linville, Chicago Motor Vehicle Company, vice president; Fred Pardee, of Pardee & Co., secretary, and Ralph Temple, of Temple & Austrian, treasurer.

The Eagle Automobile Company, a new concern, backed by John H. Vahjen, president of the Merchants Specialty Manufacturing Company, of New York, has opened a repair and storage station at 152 and 154 West 127th street, New York city. All makes will be handled, and a new machine will perhaps be placed on the market in the near future. J. C. Vahjen is the manager.

The officials of the new Ford Motor Company, Limited, are: President, John S. Gray; vice president and general manager, Henry Ford; secretary and business manager, James J. Couzens; treasurer, Alexander V. Malcolmson; directors, the foregoing officials, together with J. F. Dodge and John W. Anderson. In addition to the foregoing, Horace C. Dodge, Albert Strelow, V. C. Fry, H. H. Rackham, Charles J. Woodall and Charles H. Bennett are stockholders. One hundred

thousand dollars of the \$150,000 capital stock of the concern is paid in. The company has just completed its new factory.

The Missouri State automobile law went into effect June 23. Each machine must display a license number on front and rear.

There are now a number of automobiles in Spokane, Wash., and there is talk of forming an automobile club to take club tours.

The city council of Bloomington, Ill., has passed an 8 mile ordinance. Not less than \$5 nor more than \$200 is the penalty for violation.

William J. Hoyt, Walter M. Parker, Charles E. Green and Albert L. Clough are trying to organize an automobile club at Manchester, N. H.

Director McIlvain, of the Department of Public Works, Allegheny, Pa., has decided not to issue an order excluding automobiles from Riverview Park.

Henry R. Shoch, of the Philadelphia select council, and one of the most ardent advocates of the 8 mile an hour ordinance of that city, was arrested last week and fined \$10 and costs for running his automobile at 20 miles an hour.

Membership of the Association of Licensed Automobile Manufacturers.

The following list shows the present membership of the Association of Licensed Automobile Manufacturers. It is estimated that the twenty-six concerns named are manufacturing over 90 per cent. of the present output of the United States of gasoline automobiles: Winton Motor Carriage Company, Packard Motor Car Company, Olds Motor Works, Knox Automobile Company, the Haynes-Apperson Company, Electric Vehicle Company, the Autocar Company, the George N. Pierce Company, Apperson Brothers Automobile Company, Searchmont Automobile Company, Lozcomobile Company of America, Peerless Motor Car Company, New York Long Distance Automobile Company, Waltham Manufacturing Company, Pope Motor Car Company, J. Stevens Arms and Tool Company, H. H. Franklin Manufacturing Company, Charon, Girardet & Voigt (Smith & Malley), the Commercial Motor Company, Berg Automobile Company, Cadillac Automobile Company, Northern Manufacturing Company, Pope-Robinson Company, Kirk Manufacturing Company, Elmore Manufacturing Company, E. R. Thomas Motor Company.

Activity in the Rubber Trade.

Considerable activity is reported in some branches of the rubber goods trade, as a result of recent demands of automobile users. One prominent dealer reports an extraordinary demand for ponchos—blanket-like waterproof covers for man and machine, with head holes for one or more persons. Pneumatic cushions also seem to be slowly gaining in favor.

Club Notes.



Chicago-Mammoth Cave Club Run.

Eighteen automobilists in half as many cars started from the Auditorium, Chicago, at 11 o'clock p. m. on Thursday, June 25, for the 1,000 mile club run to Mammoth Cave and back. Practically all the cars were of the touring variety, some being fitted with canopy top, and extra tires and lug hampers were carried in every case. The party is composed of Charles W. Gray and wife, J. B. Burdette and wife, J. E. Stevens and wife, A. Scott Ormsly and wife, W. R. Smith and wife, T. J. Hyman and wife, W. G. Lloyd and wife, D. H. Crouse and wife, John E. Fry and Dr. Frank H. Davis. The trip will be reported for THE HORSELESS AGE by one of the participants.

A. C. of Pittsburg Races.

A series of races against time will be held by the A. C. of Pittsburg on Saturday, July 11, on the speedway on the lower end of Beechwood boulevard.

The course will be one mile straightaway, from a point near the river end of the speedway, which, to avoid accidents, will be roped off and protected against all traffic during the contest.

Arrangements have been made for an electrical timing device, and the course will be patrolled by police in automobiles furnished by the committee in charge.

The following rules have been adopted by the committee and approved by the governors of the club:

The contest (except in Class I) is open only to all cars owned by members of the Automobile Club of Pittsburg.

There shall be nine classes—A, motor cycles; B, electric cars; C, steam cars, under 1,200 pounds; D, steam cars, over 1,200 pounds; E, gasoline cars, under 1,000 pounds; F, gasoline cars, between 1,000 and 1,500 pounds; G, gasoline cars, between 1,500 and 2,000 pounds; H, gasoline cars, over 2,000 pounds; I, free for all, except motor cycles.

Entrance blank must be filled out and in the hands of chairman of committee on or before Thursday, July 9. Cars may be stripped to any extent at option of owner. Number of passengers carried to be optional with owner. Entries of stock cars or others than those owned by members of the Automobile Club of Pittsburg will not be accepted, except in Class I.

Entries in Class I will not be confined to members of the Automobile Club of Pittsburg, and will be open to any and all owners, dealers and makers of automobiles.

But one car will be permitted on the course at one time. Should any car become disabled, same must be removed to a place of safety before another car is per-

mitted to start. All cars must be weighed and weight returned on entrance blank. [Cars may be weighed upon scales at east side of Liberty Market, at a cost of ten (10) cents per car. W. C. Birkett in charge of scales.] All cars must be weighed in condition in which they will race. Start will be made from river end of the course. Races will be run with flying starts. Contestants will proceed to the course only via Highland Park and the River road.

The committee consists of W. C. Temple, chairman, No. 451 Wood street; Geo. W. Hailman, Reuben Miller, Jr., and W. L. Elkins.

A. C. A.

At the meeting of the board of governors of the Automobile Club of America, held June 28, an official announcement of the National Association of Automobile Manufacturers' proposed reliability run to Pittsburg, in the fall, was received from that body. In consequence it was voted that the club should not hold the much talked of reliability run to Montreal. Action in the matter of conducting the run as a tourist affair was deferred.

ST. PAUL A. C.

The St. Paul Automobile Club has been organized in St. Paul, Minn., with fifty members. Paul Gotzian has been elected president; R. C. Wright, vice president; John Patterson, secretary, and Gustave Scholle, treasurer.

COLUMBUS A. C.

The Columbus Automobile Club, of Columbus, Ohio, has now a membership of fifty-two. New officers have been elected as follows: President, Dr. Clovis M. Taylor; vice president, H. M. Gates; secretary-treasurer, Perry Okcy.

WAYNE COUNTY A. C.

The Wayne County Automobile Club, of Richmond, Ind., met last week and formulated plans for an ordinance that they propose to submit to the city council. Eight miles within fire limits and 16 elsewhere are advocated.

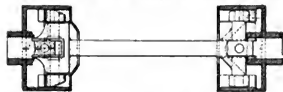
A new refractory material, to which the name "Siloxicon" has been given, is now being manufactured on a large scale by the International Acheson Graphite Company at Niagara Falls. It contains silicon, oxygen and carbon, and is said to give most satisfactory results as a substitute for refractory clays, magnesias, lime and graphite in their application to high temperatures. The product is obtained by the action of carbon on silica at a temperature of 4,500–5,000° Fahr. in the electric furnace, the quantity of carbon employed being insufficient for the complete reduction of the silica and its conversion into carbide. It is stated that in these circumstances compounds containing all three elements are obtained.



United States Patents.

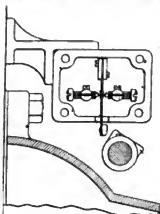
730,604. Universal Coupling.—H. Bartol Brazier, of Philadelphia, Pa. June 9, 1903. Filed August 13, 1902.

In this coupling the strains are distributed among four points of bearing instead



No. 730,604.

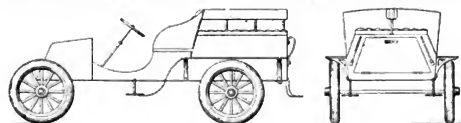
of two points, and the strength of the joint is thereby increased. Upon one of the connected shafts is mounted a casing with pockets in which are mounted blocks journaled on the end portions of a pin. This pin passes through a head of the coupling whereby the blocks are permitted to move longitudinally in the pockets and the head



No. 730,259.

to move around the pin as an axis. The head is also provided with pockets at 90 degrees from the pockets in the case, and in each of these pockets is loosely fitted a block adapted to be moved longitudinally therein and loosely mounted on a pin, so as to turn freely thereon. This latter pin is rigidly secured to the casing and is loosely fitted in a journal box through which the first mentioned pin also passes.

The casings are provided with caps, which when secured in position on said casings provide a box or chamber in which any suitable material may be placed to lubricate the several movable parts.



No. 730,352.

727,582. Rubber Cushion Tire for Vehicles.—Archibald H. Brintnell, Toronto, Canada. May 12, 1903. Filed May 4, 1901.

727,635. Carburetor for Gas Engines.—Thomas B. Jeffery, Chicago, Ill. May 12, 1903. Filed March 21, 1900.

727,682. Motor Car Frame.—Alfred Poidatz, Paris, France. May 12, 1903. Filed February 5, 1903.

727,877. Rubber Tire.—Robert Austin, Brooklyn, N. Y. May 12, 1903. Filed February 14, 1902.

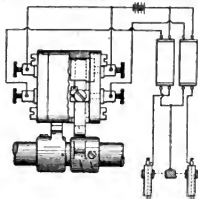
727,910. Motor Vehicle.—Byron V. Covert, Lockport, N. Y. May 12, 1903. Filed April 24, 1902.

727,917. Rotary Valve for Gas Engines.—Silas H. Dyer, Pawtucket, R. I. May 12, 1903. Filed October 5, 1900.

727,972. Carburetor for Gasoline Engines.—George Kings-
ton, Kokomo, Ind. May 12, 1903. Filed October 3, 1902.

730,515. Lock for Automobiles.—B. Dorr Colby, of Chicago, Ill. June 9, 1903. Filed November 14, 1902.

730,259. Electric Sparker.—Darwin Hanauer, of Long Island City, N. Y. June 9, 1903. Filed December 20, 1900.



The invention relates to an interrupter for a two cylinder engine and comprises a pair of contacts, a resilient conductor adapted to vibrate between said contacts, a revoluble shaft and a cam thereon adapted to strike said resilient conductor, said conductor being thereby vibrating thereby vi-

brated so as to engage said contacts in rapid succession.

730,352. Automobile.—George Otis Draper, of Hopedale, Mass. June 9, 1903. Filed December 20, 1902.

The body is provided with a transversely extending seat facing front, which is designed to be occupied by the person operating or steering the vehicle, and two longitudinally extending seats at the rear of the transverse seat, said longitudinally extending seats being situated back to back. The foot rests for the longitudinally extending seats extend over the rear wheels, and thus act as mudguards for the latter. The

space under the longitudinally extending seats affords a large roomy compartment in which tools or luggage of any description may be carried. By this construction of body at least four extra persons can be conveniently carried without materially increasing the size of the automobile body, and a space is afforded for the stowing away and carrying of a large quantity of luggage. Moreover, the passengers on the longitudinal seats are facing outwardly, and therefore their view will not be obstructed by the people sitting opposite, as is the case when the side seats face inwardly.

730,345. Two Cycle Gas Engine.—A. M. Coburn, of Daunt, Cal. June 9, 1903. Filed June 18, 1901.

730,421. Differential Gearing.—H. L. Warner, of Dayton, Ohio. June 9, 1903. Filed April 7, 1902.

730,591. Running Gear for Vehicles.—Hugh L. Warner, Dayton, Ohio. June 16, 1903. Filed July 3, 1902.

731,007. Power Translating Device.—William O. Worth, Chicago, Ill. June 16, 1903. Filed June 2, 1902.

731,022. Motor Vehicle.—Patrick J. Collins, Scranton, Pa. June 16, 1903. Filed January 29, 1902. Renewed May 19, 1903.

731,086. Motor Vehicle.—Charles B. Titus, Little River, Kan. June 16, 1903. Filed September 22, 1902.

731,174. Running Gear for Vehicles.—Henry M. Glen, Seneca Falls, N. Y. June 16, 1903. Filed November 11, 1901.

731,207. Motor Cycle.—Stephan Nechlediel, Newark, and John Pawlitschek, Orange, N. J. June 16, 1903. Filed January 29, 1903.

731,218. Vaporizer for Internal Combustion Engines.—Oscar B. Perkins, Gloucester, Mass. June 16, 1903. Filed March 11, 1903.

731,473. Means for Supporting Power Transmitting Mechanism.—Leon J. Le Pontois, New York, N. Y. June 23, 1903. Filed November 28, 1902.

731,474. Electrically Controlled Speed Changing Apparatus.—Leon J. Le Pontois, New York, N. Y. June 23, 1903. Filed December 20, 1902.

New Incorporations.

Bluffs City Auto Club, Elgin, Ill.; incorporators, L. C. Becklinger, John W. Dame and William F. McCarthy.

Corbin Motor Vehicle Corporation, New Britain, Conn.; capital stock, \$200,000; stockholders—Philip Corbin, Charles Glover, Paul Peck Wilcox and Howard S. Hart, all of New Britain; Charles M. Jarvis, of Berlin, and Epaphroditus Peck, of Bristol.

The De Loura Auto Manufacturing Company, Ft. Dodge, Ia.; capital stock, \$300,000, of which \$25,000 is reported paid up. Officers: J. H. Abel, president; L. E. Armstrong, vice president; F. C. Mingeau, secretary and treasurer; H. E. De Loura, manager.

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The Gordon Bennett Race.

The race for the Gordon Bennett cup
has once more been run and the cup has
again changed hands. Of all the cup races
so far held this one was undoubtedly the
most hotly contested; in fact, it was the
first that aroused any considerable public
interest and the first in which more than
one country was represented by a complete
team.

While, so far as is known, there were no
fatal accidents in this race, there were two
accidents which might easily have proved
serious. Jarrott's mishap was one of that
kind which he himself described recently
as "comprising all the elements of a tragedy
with the tragedy left out"—that is, if
his mechanic was not fatally hurt, as might
be inferred from an early cable stating
that he had been "crushed" beneath the
car.

What lessened the danger in the race
was that a number of the contestants drop-
ped out in the first few stages and those
remaining were nearly equally matched, so
there was no more passing.

This race will undoubtedly be held up
by the sporting element as proof of the
perfect safety of races "properly organ-
ized," forgetting that a single case does not
justify a general conclusion and that the
exception rather confirms the rule. How-
ever, even if there were no chance of any
more serious personal accident than a dis-
location of the shoulder, as in this race,
or a fracture of the knee, as in the Ar-
denne race, these races would still have
a phase of brutality that would repel the
average person.

We presume that after the comparatively
poor showing of the English team, or their
multiplied misfortunes, looking at it in a
different light, international races will be
less popular in England. Not only has the
British club lost the cup, but, if reports
are to be trusted, it has incurred a very

heavy expense for the organization of the
race and the guarding of the course, which
expense a subscription among members
has thus far entirely failed to meet. Con-
sequently the event threatens to be fol-
lowed in England by a moral "katzenjam-
mer," unless, as is to be hoped, the minor
events of the fresh fortnight prove very
successful.

The American team was even less suc-
cessful than the British, and if it is true, as
the sponsors of the racing movement so ve-
hemently assert, that the international
markets are strongly influenced by these
international contests, then the interests of
the American industry have certainly not
been advanced by this race. We see, how-
ever, no reason to change our view, for-
merly expressed, that while success in such
races may favorably affect the business of
the manufacturers of the successful car, it
can have little or no effect on the entire
automobile industry of a nation, and Eu-
rope will continue to buy American cars
the same as heretofore. This is a matter
in which price and reliability under normal
conditions count, and in these points Amer-
ican road machines can well hold their own
in the markets of the world.

The next question to come up will be
where the cup race can be held next year.
The rules require it to be held in Germany
if possible. In general the authorities in
the German states are strongly opposed to
automobile racing on the public highways,
as may be inferred from the fact that there
has been no road race in Germany since the
Paris-Berlin race, two years ago. It is
thought that political reasons counted
heavily with the authorities when they gave
their permission for this race. It will be
remembered that the Bavarian Government
refused absolutely to grant permission last
year for the Paris-Vienna race, to be run
through its territory. The English Gov-
ernment is frequently accused of excessive

conservatism, but in matters of this kind the governments of the leading German states are certainly much more conservative, perhaps because fewer of their members are of that class known as "sportsmen."

But Germany comprises twenty-six states, each making its own laws, and the only apparent means of holding the race on German territory would be to obtain the consent of the ruler of some small state, who otherwise would have little opportunity of making the world aware of his existence. But these small states are of too limited area to afford a suitable course, and it is also to be expected that pressure would immediately be exerted by the imperial government on any state showing inclination to sanction a race.

The sentiment of the Government is the same in all other leading countries, and the Gordon Bennett cup race has therefore probably been run the last time as a long distance road race, unless it is held in an uncivilized country, which is the proper place for it.

Why the American Team Lost— Racing and Service Cars.

Many American automobilists will no doubt ask themselves what was the reason of the comparatively poor showing of the American team in the Gordon Bennett cup race. It is held by some that it was due to "ill luck," but this is no explanation, as luck alone does not win a race nor can it be the cause of losing. The simple reason is the want of experience of Americans in building and driving road racing cars. Leaving out of consideration for the moment the experience of the Winton Company in building a machine for the Gordon Bennett cup race in 1900 and the experience of Winton in driving this machine, neither of the two American builders of Gordon Bennett cars had any experience in building machines for long distance road races, and none of the three American representatives had any experience in driving in such races.

The very opposite applied to the French and German teams. The three firms which built the cars for these teams make a specialty of building for the market machines which in every respect are duplicates of their racers, except that instead of a skeleton seat they have a comfortable body. The Daimler Company, for instance, builds few vehicles that are not capable of 50 miles an hour on good roads,

and all three firms have participated in practically every important road race for the last three or four years.

The drivers of these cars were not a whit less experienced in the "racing game" than the builders. De Knyff, for instance, is known as the veteran of road racing and has probably a longer racing experience than anyone else. Farnham, Jenatton and De Caters have also raced in most of the chief events of the last three or four years.

The factors which make for victory in such a contest can only be determined by experience, and if the American manufacturers consider it worth while to devote a considerable portion of their works to experiments with racing cars for the next few years and train a force of professional drivers, they may then meet the Continental manufacturers on equal terms. Without this experience they have little chance in such a contest.

The defeat of the American team is being exploited by a number of representatives of foreign machines in this country to further their own ends by decrying American made machines generally. We believe the American public can be credited with sufficient intelligence to see the difference between a service machine of 5 to 15 horse power and a racing car of 70 to 100 horse power and between a service test and a pure speed test. The race was lost because of want of experience in building special cars for road racing, but in the construction of service cars American manufacturers have had more experience than those of any other country, and in a service test American autos can easily hold their own, as last year's endurance contests in this country and Great Britain conclusively proved.

Electric Charging Facilities.

As the usefulness of the electric vehicle is limited by charging facilities the establishment of a large number of charging stations in Boston and neighboring towns by the Boston Edison Company should prove a great aid in extending the use of these vehicles in that part of the country. Boston, owing to its many fine suburban roads, is already one of the best markets for electric cars, and a complete system of charging stations will make the conditions in that city for the use of electric vehicles about as favorable as may be at present. When all the charging stations contemplated by the electric company are completed, and with the charging facilities of-

fered by automobile storage stations, it will be possible to make quite extensive trips in electric vehicles in the vicinity of Boston without danger of getting beyond the range of charging accommodations. A road map, showing the location of the various stations is soon to be published, we understand, which will further aid to the convenience of electric vehicle users.

Electric lighting companies in other cities, where conditions are favorable, will do well to follow the example of the Boston company and establish a regular system of charging stations. The use of electric vehicles will increase with improved charging facilities, and automobile charging will then become a considerable source of revenue to the lighting companies. This class of work ought to be specially desirable for these companies, as it comes mostly during the day when the lighting load is small and most of the plant idle.

Government Consideration for the Automobile Industry in France.

Convincing proofs have repeatedly been given that the French Government is willing to make great concessions to a national industry so important as that of the manufacture of automobiles. The recent Paris-Madrid race furnishes a striking example. The permission for this race was granted, it was explained by the Premier, because the automobile manufacturers considered it necessary to their business. After the race had ended disastrously and a portion of the public clamored loudly for more severe regulations the Government very wisely prohibited all future road racing, but instead of engaging at once in ill advised legislation, it appointed an "extra parliamentary" committee, composed of leading men representing the various interests involved, to study automobile legislation and related questions. The various bodies represented in this committee of sixty-two members are the Senate, the House of Representatives, the State Council, the Department of Mines, the Department of Roads and Bridges, the Automobile Manufacturers' Association, the Union of Mechanical Workers, the Chauffeurs' Association, the Automobile Club of France, the General Automobile Association, the Touring Club and automobile journals.

The work of this committee is to consist in devising the best possible means for removing the objections which the general public not using automobiles make to these

vehicles. Chief among these objections is, of course, the excessive speed frequently indulged in by some automobilists. The public, however, also complains of the noise, smoke and smell of automobiles, as well as of the dust stirred up, particularly by fast cars, and the commission is to investigate means of reducing these objectionable features to a minimum. Finally the causes of accident and the best means of avoiding interference with horse traffic, are to receive attention.

It is unreasonable to expect that any of these problems will be definitely solved by the committee, but its work will give a stimulus to improvement in these directions and in this sense this latest move of the French Government cannot but prove beneficial to the automobile industry.

What we wish to call attention to particularly, however, is the recognition the French industry receives from the Government. One factor in this connection is undoubtedly that the automobile industry is the only mechanical industry of France that can compare with similar industries in other countries. It is certainly very encouraging to see the Government and the automobile interests working harmoniously together in evolving the best possible regulations for automobile traffic, and it is to be hoped that before long the same harmony will prevail between the authorities and the automobilists in this country, instead of a feeling of antagonism such as at present undoubtedly exists here.

Calendar of Automobile Dates and Events.

- July 1-15.—Irish Fortnight.
 July 11—Pittsburg Speed Trials.
 July 15-19—Oswest Automobile Week.
 July 24—Quarterly 100 Miles Trial of A. C. G. B. I.
 August 10-22—Tourist Motor Bicycle Reliability Trials.
 August 30.—International Races of the Frankfurt Automobile Club, Frankfurt-on-the-Main, Germany.

Public Demonstration of Automobile Construction.

The strides recently made in automobile construction will very shortly be exemplified in an interesting manner by a British company, which is to give a public exhibition, demonstrating the assembling of the different parts of a car. Each part will have been separately constructed, according to measurement, and sealed in the department in which it has been constructed, and when the car is finished "it will be at once driven out of the shop for a 100 mile non-stop run."

Gasoline and Steam Vehicles Compared.

By A. L. CLOUGH.

It is seriously to be doubted whether there is anyone really competent to write an article upon this subject which shall be free from prejudice and entirely fair to the two motive powers. Hardly a person can be found who has personally given steam and gasoline an equally favorable and extended trial or who was free from bias when his use of motor vehicles began, and a writer's view of the subject may be affected by personal experience which is not common to other users. He may have had bad luck with gasoline vehicles and good fortune with steam or the reverse, or he may have been witness to the experiences of others, which are not truly representative but which cast undue discredit upon one or the other of the two powers. Hardly any person's experience has been broad enough to have correctly averaged the advantages and disadvantages of the two systems, and such a writer's view is necessarily somewhat ex parte. The contributor of an article upon this subject can at best merely try to be just and hope that in case he has shown a bias someone else will set his readers right by presenting the other side of the picture in as fair a manner as possible. It must also be borne in mind that one motive power may be particularly applicable to some conditions where the other might prove unsuccessful, and vice versa.

It may be well to divide this comparison into certain definite heads, and first and foremost should be considered the relative

SAFETY OF THE TWO MOTIVE POWERS.

With a large amount of energy confined in a steam boiler at high pressure a certain danger would seem to be involved, but it is a remarkable fact that the explosion of vehicle boilers is almost unknown. These boilers being of very small possess a very large factor of safety and generally leak around the tubes and allow the reduction of the pressure before the shell is endangered. If the boiler becomes dry either a safety plug melts or the boiler burns out and prevents the attainment of explosive pressures upon the introduction of feed water. It can hardly be held that steam vehicle boilers have proved dangerous, and even the possibility of danger from them is practically eliminated when they are of the water tube variety or of the flash type in which the amount of energy stored is very small.

In some steam vehicles the whole gasoline supply is stored under a considerable pressure—as much as 40 pounds in some cases. In others only a comparatively small amount of the fuel is under pressure. The collapse of these tanks, containing large amounts of gasoline, or the development of leaks therein due to road vibrations or other causes, has been the cause of most serious accidents. The inflammable

fluid is scattered about under the influence of the pressure and is almost sure to ignite with very lamentable results. If only a little gasoline is under pressure and the remainder simply stored the effects of a leak may not be nearly as serious. The fact remains that in the steam carriage there is constantly burning a more or less exposed flame, and any leak of fuel, whether from tank, piping or burner is almost certain to cause a fire by the liquid or vapor coming in contact therewith. By careful piping the use of the strongest tanks with a minimum amount of fuel under pressure, and by the employment of metal bodies and frames in steam car construction, danger from fire may be minimized, though never, in the nature of the case entirely eliminated.

Possessing a large store of energy the steam carriage is more likely to be involuntarily started than is a gasoline car. Although throttles and reverse levers are intended to be securely locked in the closed position, accidents due to leaky throttles or throttles being inadvertently or maliciously opened, are not uncommon. The action of a steam carriage is so energetic and powerful, the instant the throttle is opened either intentionally or unintentionally, that some damage is very likely to be done whenever the power is thrown on in-advicely. With a gasoline car the engine must be speeded up and the clutch engaged before a start can be made, and then its movements are much more sedate and gradual. It can always be stopped either by disengaging the clutch or shutting off the spark and it can generally be stalled by the throttle alone.

Since the gasoline car possesses no storage of energy under pressure the explosion question may be disregarded. However, it uses the same fuel as does the steam car, and if it is ignited involuntarily a fire will ensue. Gasoline is never stored under pressure on hydrocarbon cars, and, as they carry no exposed flame, the danger of fire is very small. Gasoline cars have taken fire in rare instances from leaks developing in the piping or tanks or an account of gasoline dripping from flooded carburetors and the vapor becoming ignited by sparks from wiring, or plug connections or from muffler explosions, but the cases are so rare as to be hardly worthy of mention.

The cases of "runaway" gasoline cars, due to the unintentional application of the motive power, are practically unknown, owing to the fact that several acts are necessary to bring this about.

READINESS FOR SERVICE.

Assuming everything to be in working order the time required to put into operation the two classes of vehicles is somewhat in favor of the gasoline car. The steam car requires the heating of the vaporizer of the main burner and the raising of steam. The time required for the first operation is about equal in all steam vehicles, but the latter varies in proportion to

the water space of the boiler from almost nothing in the case of flash boilers to several minutes in the case of flue boilers of considerable capacity. The starting operations with the gasoline car consist of the closing of the electric switch, the priming of the carburetor and the cranking of the engine. It would be very good practice to start a steam vehicle from cold water in five minutes and very bad practice to fail to start a gasoline vehicle in fifteen seconds.

CONVENIENCE IN DRIVING.

The amount of attention required by drivers of cars of the two systems, in normal operation, is worthy of comparison: Neglecting the operations of steering and braking, a steam carriage operator is concerned with his throttle alone, so far as the application of the power is concerned. This appears to be almost ideally simple, particularly as the control of the lever becomes almost automatic after a little practice. He has, however, to keep his eye upon his water glass quite closely and regulate his feed water to meet the demands of the engine.

Automatic water levels have been devised to obviate this necessity, but none of them have proved perfectly reliable. If the water level is not correctly maintained a flooded engine or a burnt out boiler or blown plug may be the penalty. The water glass is probably the greatest bother about the steam carriage and the flash system of steam generation has an advantage in obviating its use.

The fire in a steam carriage is supposed to be automatically regulated by means of a fuel regulator actuated by the steam pressure. These regulators are fairly effective, but still the steam gauge and the condition of the burner demand some attention. The air pressure gauge is consulted sometimes to determine whether there is sufficient pressure to properly supply the burner with gasoline.

The large water consumption of steam vehicles creates some little anxiety in the mind of the driver as to the condition of his supply tank.

The operator of a gasoline car is, like the steam carriage driver, chiefly concerned with his throttle—the movement of which, as in the steam vehicle, becomes automatic through practice. The control of his spark position is automatically maintained in some machines, but when not so arranged demands a slight amount of attention. He, however, has to shift his gears occasionally when the slowing of the vehicle indicates the necessity, and to shift them back when the necessity ceases. Many miles of good roads may be covered without a change of gear, and gear shifting is hardly necessary save at starting and upon very bad hills if the machine be of ample power and provided with proper sprocket ratio. He has no gauges or other indicators to watch and need have no thought of his water supply while on the road. Although

the ideal of "nothing to watch but the road" is seldom actually attained, it is very closely approximated.

The fact is that the operator of a steam car is more busied with the production of his motive power and less occupied with its application than the driver of a gasoline vehicle. The generation of the steam power is not strictly automatic, but requires manual regulation of the water supply, while the production of the power in the gasoline engine is perfectly automatic. On the other hand the application of the steam power to purposes of traction is the simplest imaginable, while the application of the gasoline power is fraught with the occasional throwing of gears; the frequency of the operation being dependent upon road conditions.

The operation of the gasoline vehicle certainly calls for less watchfulness upon the part of the operator, and a failure to handle the motive power correctly can hardly result in any injury to it, as may be the case with steam.

"GROOMING" REQUIRED.

To secure the normal operation of either of the motive powers careful inspection in the stable must be performed.

The steam vehicle requires most rigid scrutiny for leaks in steam, water and gasoline piping and tanks, the renewal of packing in pumps and valves, the cleaning of pipes, portions of the vaporizer and burner, where carbon may be deposited, and check valves, and the grinding of throttle and needle valves.

The gasoline car requires frequent attention to batteries, spark plugs and vibrators. The carburetor should be frequently cleaned, valves occasionally ground in and the clutches adjusted. Circulating pumps bear a little watching, as do circulating pipes and radiators. Where cylinder head gaskets are used there is a little replacing to be done once in a while.

It is probable that the motive power of a gasoline car requires somewhat more care in the stable than does the power plant of a steam vehicle. This is increasingly true in case the gasoline vehicle is of the three or four cylinder type.

A gasoline engine requires the exact fulfillment of several easily realized conditions in order that it shall operate. Unless they are properly realized the engine may not run at all. If they are fulfilled the engine is perfectly automatic and capable of doing its full work indefinitely.

The steam engine is somewhat different in this respect. It is not quite so particular as to the conditions. It may be badly out of adjustment and repair, but when the steam reaches it something generally has to turn around. It may operate very badly, indeed, but it will still keep on moving when conditions are most unfavorable, because it has the boiler as a vis a tergo and although it may leak steam at every possible point, it will most likely not entirely refuse to "mote" as long as nothing breaks. As to

RELIABILITY OF THE MOTIVE POWER

hardly any distinction can be made. With equally careful construction, inspection and operation both are dependable in about the same degree. More people have a general knowledge of the working principles of the steam engine than of the gasoline motor (or have had until very recently) and this fact has had its bearing upon the relative performance of the two motive powers in the hands of the general public. It is probably true that a gasoline vehicle engine is more subject to sudden stoppages than a steam engine, but unless in very ignorant hands the difficulty is very easily and quickly remedied. When a steam engine "lies down" there is likely to be something serious the matter. A little special training is necessary to secure the most reliable results with the gasoline motor, on account of electricity being an important factor in its operation. Steam vehicle engines have been given a bad name by being built upon too frail lines and exposed to the dust and mud from the road, while gasoline engines have suffered from miserably inadequate sparking arrangements to an even greater extent. Both steam and gasoline vehicle engines are straightforward engineering propositions and both can be made as reliable as any human mechanism which operates under equally adverse conditions.

(To be continued.)

Commercial Motor Vehicles in France.

(Continued.)

By DR. LEON GUILLET.

The uses to which commercial motor vehicles have been put are (1) collective transportation of passengers, (2) transportation of merchandise, (3) transportation work of a special nature.

The roads of France are particularly favorable to the development of automobilism, but are often not very suitable for commercial motor traction, especially those situated in marly territory. It is therefore necessary to limit these vehicles to a certain maximum weight. In determining the weight the following points must be considered: (1) the loads for which the roads have been constructed; (2) the strength of bridges, viaducts, etc. Loads of 8,000 to 10,000 kilograms may be considered the maximum for a four wheeled vehicle.

The same as the weight of commercial vehicles, their speed must be limited, and finally it is necessary to determine a proper width of tires, in accordance with the loads to be supported. Loubet, who has made a study of the question of the speed of heavy vehicles, has made some very conclusive experiments, which showed that a vehicle weighing 10,000 kilograms, begins to destroy the road as soon as an average speed of 10 kilometres per hour is exceeded. It is, moreover, well established that too narrow tires cut up the road surface if the vehicles are heavily

loaded. Vehicles which, when loaded, exceed in weight 12 to 15 tons do not as a rule give good results, and numerous experiments which have been made prove that weights of 8,000 to 10,000 kilograms should not be exceeded with commercial vehicles when loaded, and that loads of from 15 to 25 tons should be divided between two or three vehicles attached to a tractor.

Among the different experiments made we would mention those during the great manoeuvres in the East of France, with a tractor fitted with wheels of 12 inches width, of a weight of 8,000 kilograms and running at speeds of from 6 to 8 kilometres per hour. It was observed that the wheels of the vehicle smoothed the road surface the same as a regular road roller.

Another question of great importance is the cost of operation. Let us first of all give the opinion of M. Bret, a civil engineer, who has made a study of this subject. The great rise in the price of coal in 1900 led the city of Paris to deal directly with the coal mines and store up a large supply of briquettes, which were transported to sub-stations according to temporary needs. M. Bret, who was charged with studying the question of transporting the coal in Paris, inquired whether, in view of the rapid progress of automobilism in general, it would not be advisable to use motor propelled coal wagons instead of horse wagons. After an extensive investigation he arrived at the following conclusion:

"With the prevailing prices of fuel, motor trucks will have difficulty in competing with horse trucks. Animal traction is more economical for light loads; mechanical traction only becomes less expensive than horse traction for loads of at least 2½ tons (with steam motive power); electrical propulsion may be employed under special conditions, permitting economical production of the electrical energy; the excessive price of gasoline (conditions in Paris are

here considered) retards the development of gasoline trucks which might otherwise be of great service for transporting loads of less 2½ tons, owing to the smaller first cost and weight of these vehicles.

"At present motor traction does not appear practicable except for the transportation of heavy loads, which would require the use of several horses, the efficiency of which varies inversely as their number, and in cases in which the question of speed overshadows that of economy. It is owing to superior speed that the cost of operation of motor vehicles may become comparable to the cost of operation of horse vehicles. The daily work of a truck of given power can thus be doubled, without resorting to excessive speed, in order to avoid excessive fuel consumption and depreciation. A line of work in which the higher speed ability is of no consequence could not profit by the use of motor vehicles.

"In classes of work where the use of the vehicle is intermittent the motor truck has the advantage that when not in use it does not cost anything. The resulting economy is particularly appreciable with gasoline trucks, with which the cost of fuel may constitute one-half of the total cost of operation."

In concluding these interesting remarks M. Bret states it may be hoped that the experience gained and the progress made in the manufacture of metals and methods of working them during the last few years will permit of constructing vehicles offering every guarantee of strength and reliability, and thereby greatly reduce the cost of maintenance. The price of the trucks themselves will come down in the future, as well as the price of the fuel, and then mechanical traction will become really practical and economical. At present the choice of motive power—animal or mechanical—necessitates a careful study of the prevailing conditions.

It remains to examine the development

in France of the different applications of commercial motor vehicles.

COLLECTIVE TRANSPORTATION OF PASSENGERS.

This application may be subdivided into two branches—the transportation of passengers between towns which have no railroad communication, or at least no direct communication, and passenger carriage between a railroad depot and towns and villages at a certain distance therefrom. As examples of the former we have the service between Saint Germain and Maisons Laftite, in the vicinity of Paris, which has now been in operation for a number of years, and the service organized by the Compagnie des Messageries Automobiles in the vicinity of Rouen, to connect several outlying manufacturing towns with the city proper. Examples of the second kind are plentiful in France; there are already numerous railroad companies which have established automobile lines; we mention those in the vicinity of Vannes and St. Etienne. In this class also belongs the use of motor vehicles in cities by schools and colleges to carry scholars to school in the morning and bring them home at night.

TRANSPORTATION OF MERCHANDISE.

Applications of this kind are extremely numerous. Who has not seen in Paris the so called Trains Scotté used for transporting merchandise or building material? In the construction of the metropolitan underground railway very long trains are used to carry the excavated material from the tunneling place to the suburbs, where the old race track is being filled up. But the most interesting application is that of the transportation of manufactured goods from the works to the consumers, and of materials of construction to the factories where they are to be worked up. Among numerous examples we mention the delivery service of the large Paris stores, particularly clothing and grocery stores. On the other hand we would mention the use of motor ve-



DE DION INSPECTORS' CAR.



NARROW GAUGE RAILROAD CAR, WITH AUTOMOBILE MOTOR EQUIPMENT.

hicles by one of the largest sugar refineries of France, that of Cambrai, which transports the sugar beets, that is to say, the raw material, by means of motor trucks.

SPECIAL TRANSPORTATION WORK.

The commercial motor vehicle is also used in France for numerous special purposes. The Government Department of Posts and Telegraphs has ordered a large number of vehicles for the service in Paris, for collecting the mails and carrying them to the railroad depots. Numerous mail contractors carry the mails between towns, villages and country places without railroad communication by means of motor mail wagons. Finally, French railroad companies have made very interesting and conclusive experiments on the use of automobiles on railways. The Paris-Lyon-Méditerranée Railroad Company employs these vehicles for service on certain branch lines, such as that leading from Alais to

shown in the accompanying illustration, has the advantage that by a simple transformation of the seat it may be used for the transportation of night dispatches.

The frame of this car is constructed of steel tubes, 45 millimetres (1.6 inches) in diameter and of 2 millimetres thickness of wall. The frame is 100 inches in length, and is provided at both ends with grip handles by which it can be easily lifted off the track. This car weighs only 660 pounds, and may therefore be readily operated by only one man. The driver is seated in the rear on a skeleton seat, the same as with an ordinary tricycle. He may rest his hands on the handle bar, but this bar is immovable, as the car has no steering gear. No differential gear is used, the radius of curvature of the track being always sufficiently large to make it unnecessary. The motor is of $3\frac{1}{2}$ horse power, is water cooled, and is fitted with variable exhaust mechanism. The rear axle is driven

steel tubes of 40 millimetres (1.6 inches) diameter. The end crosspieces are provided with buffers and with attachments for fastening other vehicles for carrying merchandise respectively. The total length of the frame is 20 feet; the distance between the axles, 80 inches. The two transverse seats will accommodate three persons each. The backs of the seats may be reversed, which permits of the passengers always facing forward. The passengers are protected against wind, rain and sun by two windows, one in front and one in the rear, and a canvas roof.

One of the features of the vehicle is that it may be operated from both ends, double handles, pedals and levers being provided. The motor is a single cylinder one of 4.4 inches cylinder bore and 5.2 inches stroke. It is provided with variable exhaust and with cooling water circulation by means of a pump. At a speed of 1,500 revolutions per minute it develops to horse power. Motion is transmitted from the motor to the driving axle by means of a clutch and a two speed gear, enclosed in a casing, and by means of a longitudinal Cardan shaft and a reversing gear, enclosed in a second casing. The reversing gear is composed of three bevel gears. A bevel pinion D keyed to a longitudinal shaft is always in mesh with one or the other of two bevel gears AA' keyed to the shaft B. The latter transmits motion to the wheels fixed to the shaft CC through the intermediary of the pinions P and P'. By substituting pinion A' for pinion A, by means of a cam E, operated by a lever, a reversal of motion is obtained. The pinion A gives forward motion and the pinion A' reverse motion.

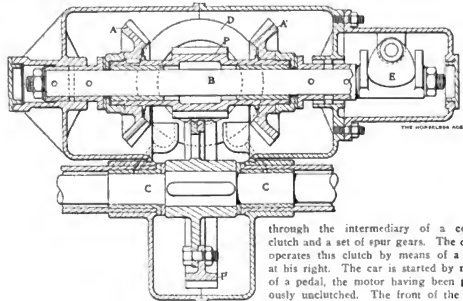
Two kinds of brakes are provided to stop the vehicle; one a steel band brake lined with leather, which engages the drums seen at the inside of the four wheels, and another, operated by means of the pedal B, which causes first the speed of the motor to be reduced to 300 revolutions per minute and then acts on the drum C.

The weight of this car in running order is 2,420 pounds. The water tank has a capacity of 12 gallons, the gasoline tank a capacity of 8 gallons and the range on one charge of supplies is 250 kilometres. The speed on the level and on grades up to 1 per cent. is 40 kilometres (25 miles) per hour and on steeper grades one-half as fast.

CONCLUSIONS.

The conclusions to be drawn from the preceding investigation is that the commercial automobile is making considerable headway in France. The manufacturers are constantly improving their designs and are showing an unmistakable tendency to abandon steam in favor of gasoline.

On the other hand, the consumers—merchants, manufacturers, etc.—are beginning to show an active interest in the possibilities of mechanical traction. The numerous applications show that the commercial vehicle is becoming an important factor in the automobile industry of France.



REVERSING GEAR FOR DE DION PASSENGER CAR.

Port L'Ardoise. M. Serpollet has designed a complete line of vehicles for this kind of work.

The question of using automobiles for an intercalary service on the main railway lines is also receiving attention, but this question is far from being definitely settled. Finally, mention should be made of automobiles for the inspection of tracks (inspectors' cars). Messrs. De Dion & Bouton have recently constructed a light quadricycle, propelled by a gasoline motor, for this purpose. It may be said in advance that a light gasoline car is superior to a steam vehicle for this purpose, as the gasoline motor is always ready for operation, which is particularly advantageous in case of derailments, collisions and other accidents upon the track. Moreover, the vehicle must be easy to handle, be readily taken from the track, placed on another track, etc. It is therefore necessary that its weight be as small as possible. The De Dion-Bouton quadricycle referred to,

through the intermediary of a conical clutch and a set of spur gears. The driver operates this clutch by means of a lever at his right. The car is started by means of a pedal, the motor having been previously unclutched. The front of the vehicle may be provided with a seat to carry two persons or with a trunk for the dispatches. Two brakes are provided, acting on the two axles respectively, one operated by the driver by means of a lever and the other, which constitutes an emergency brake, by the person occupying the front seat, also by means of a lever. The quadricycle just described was tested in 1900 on the 40 inch gauge track between Valmondois and Marines (Department of Seine et Oise). At present it is employed for carrying the mails between Hoyelle and Cayeux (Somme). Its traveling speed varies from 20 to 40 kilometres per hour, according to grade; it may be forced to 60 kilometres by using transmission gears of suitable proportions. Other vehicles of the same type are used on different railroad lines, particularly in the Transvaal and in Turkey.

De Dion-Bouton have also constructed a wagonette or quadricycle for six passengers, which is in use on the line from Sfax to Gafsa, and serves to transport passengers and mails. The frame is constructed of armored wood beams, cross braced by

Maintenance and Repairs.

IX.—Removing the Sprockets of Steam Runabouts.

By W. O. ANTHONY.

The front sprocket of steam machines is at times subject to excessive wear, and to replace it with a new one necessitates the removal of the engine shaft. The most common method of construction of these shafts is to make either crank and one-half the length of the main shaft in one piece and provide a sleeve in the centre for carrying the four eccentrics and the flange, to which is fastened the sprocket. The halves of the shaft are made to fit into the sleeve and are held against rotation or endwise movement by two taper pins, fitted on either side of the sprocket, diametrically through the shaft and sleeve. To get one of these shafts apart it is necessary first to drive out the taper pins; then by gripping one of the cranks firmly in the vise between plates of sheet copper, to avoid marring, while someone turns the other crank with a wrench, tap moderately upon the inside of this crank with a copper or babbitt hammer, taking care not to strike hard enough to spring the crank cheek. If this fails to start the shaft, strike upon the cone on the side opposite to the crank, and continue striking all the way around the cone. A little turpentine poured into the taper pin holes and around the joint between the sleeves and shaft will sometimes assist to remove any deposit of rust or corrosion. If new cones are required on the main shaft, they may be fitted while the shaft is thus apart. If the old cones are simply worn on the outer surface but are still tight on the shaft, the best way is to send to the factory for new cones, which, if interchangeable with the old, may be very quickly driven to place. However, should the old cones be worn loose upon the shaft, in all probability the shaft will have to be turned down slightly where the cones bear, there being a slight shoulder to allow for this, and new cones made and fitted a driving fit over the newly turned portions. They should be turned from the best quality tool steel and tempered a light straw color. The tempering is a part of the work that no one but an experienced man should attempt

and expect to secure good results. In boring the holes in the cones a slight fillet on the side going next the crank must not be forgotten, as this is or should be always left upon the shaft at its juncture with the crank cheek.

These cones are best made of the shape shown in Fig. 10, in which the fillet is shown at A A. If the old cones are tight upon the shaft they may be removed by placing the crank in the vise as in Fig. 11, letting the projecting edges of the cone rest upon the top of the jaws and hammering upon the shaft, not too hard, with a copper hammer, or by placing a block of hardwood upon the shaft and striking with an ordinary heavy hammer. In no case must the end of the shaft be struck with anything harder than the shaft itself, as it would be spread and the fit in the sleeves spoiled. The part shown in Fig. 11 at A is the crank pin with its cone B.

A few hints regarding the removal of the engine shaft without taking the engine from the vehicle may prove useful. Loosen the nuts upon the outer ends of the wrist pins and remove the latter. Disconnect the eccentric rods from the links by removing the pins which hold them in place, and it may save time and trouble when re-assembling the engine if the location of the eccentric rods relative to the ends of the links is made a note of. For instance, in many machines the two inner eccentrics go to the forward end of their respective links, and by jotting this down before disconnecting you may avoid getting things back so that the engines work one against the other and will not run, or so that the engine reverses with the reverse lever in the forward position.

Now remove the caps which hold the bearing cups in the frame, and by tapping lightly upon both crank cheeks at once, having of course removed the chain, these cups will generally come out quite readily, when operations upon the shaft may be performed unhindered.

The front sprocket is usually fastened to its flange by five or six machine screws, and these sometimes work loose and wear away the threaded part in the hole so they cannot be screwed up tightly and made to stay. In such case the writer has generally put in new screws, and letting them extend through the flange about one-sixteenth of an inch, riveted them over firmly, as little trouble will be experienced should it become necessary to remove the sprocket, and the riveted ends may be readily cut off with a sharp cold chisel.

Sometimes the holes are so badly worn that screws will not take hold at all. In such a case common iron rivets may be put in, and hammered down solidly. Should it be necessary only to re-fasten the sprocket in this manner, it may be done without disconnecting the shaft by holding a heavy cold chisel upon the small end of the rivet with the head upon an anvil or a heavy flat mandrel held in a vise. By striking sharp blows with a medium weight

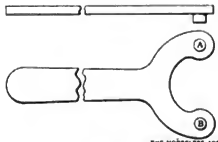


FIG. 12.

hammer as close to the rivet as possible they may be riveted in a fairly substantial manner.

It sometimes becomes necessary to remove one or both halves of the rear axle of the usual type of steam stanhope or runabout. These are made very much alike on many of the standard makes of machines. A taper pin through the hub of one of the main gears of the differential and the shaft within it keep the latter from unscrewing. This pin should be, and usually is, held from possible loosening and dropping out by a spring cotter pin. By removing this latter the taper pin may be driven out. Now the rear wheel on the side from which the axle is to be removed should be jacked up, and a special wrench, which is made very much like the sketch in Fig. 12, be applied. This wrench is in reality a giant bicycle spanner, and the two pins A B are made of a diameter to fit the two holes usually found in the large gears of the differential, and their distance apart will, of course, be the same as these holes. The handle should be 3 feet long and be given a slant of about 45 degrees to a line drawn across the two pins.

Now, by inserting this spanner and having someone to turn the wheel in a forward direction for the right wheel and backward for the left (this being the usual construction) the axle may be unscrewed from the differential. In putting back such parts it is an excellent plan to well oil the threaded portion and smear with graphite. This will render the joint proof against rusting in.

The Aeronautical World, devoted to the interests of sky navigation, is one of the latest additions to the journalistic field. The advertising columns are the most interesting part of the paper. From them we learn that the Aeromobile (60 miles an hour guaranteed) for navigating the air, water or on land, is a new type of conveyance for which a limited number of orders will be booked at \$600 each. The advertisement says: "Don't waste time asking questions, but if you mean business and command the cash send your order." Another inventor who has "proved" the practicability of a flying machine wants to raise the capital. Two people wish to sell gasoline motors which are "just the thing for air ships." Another man, who evidently tells the truth, advertises, "Clever performer with good hot air attachment is open to book engagements."—*Machinery*.

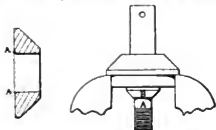


FIG. 10.

FIG. 11.

TOURING IN

~ ~ AMERICA.

III.—Northern New Jersey.

By C. H. GILLETTE.

It seems strange that the State of New Jersey, which manages her finances most successfully, which, from her full treasury, spends more money in proportion to population for good roads than any other State, and in so many directions is just a little in advance of her neighbors, should be looked down upon by her sister States with something akin to contempt. Can it be that we from New England and New York have formed our opinion from what little we have seen of her from the windows of a Pullman as we travel from New York to Philadelphia? Or does the plaint of the comic artist anent commuters, country cooks and mosquitoes breed a fancy of superiority?

Have we come to the conclusion from the very small part of it that we have seen that all of New Jersey is flat and uninteresting?

Certainly the coast skirting meadows are uninteresting, and what we see of the country from the trains would hardly tempt us to an automobile trip there. Beyond that first low-lying range of hills, however, is one of God's own garden spots—hills, valleys, rivers and lakes as beautiful as they are profuse. Let the doubting Thomas brave for once the inconvenience and annoyance of the ferry and that unpleasant run across the marshes, and continue on through Newark and Montclair, on over the first mountain and into the valley beyond. If he does not find enough of natural beauty and interest to keep him and

tempt him to return he is beyond redemption as a nature loving tourist.

Fortunately there is more than one way from New York of getting into this more than ideal touring country. The most direct route is by far the most unpleasant—that is, the road from Jersey City to Newark across the Hackensack meadows. There is a movement on foot at present looking toward the construction of a new road across the marshes from Hoboken to Belleville, a few miles north of Newark, and such a road will probably be completed within two years. New Jersey, never slow to see opportunities and to take advantage of them, will recognize in more ways than

by its liberal automobile law the demand of the public, the dealers, manufacturers and hotels, that the use of automobiles be encouraged and tourists from other States be invited and welcomed.

THE ROUTE THROUGH STATEN ISLAND.

At the present time there are two other ways of getting into Northern New Jersey from New York, which, although somewhat roundabout, afford good roads and pleasant scenery. One of these routes is by way of Staten Island, taking the Fort George ferry at Whitehall street, New York. Following the trolley line along the northern end of Staten Island brings one to the ferry which crosses to Elizabethport, on the mainland. From here the road is straight out from the ferry, following the trolley line on good macadam road direct to Elizabeth. Out of Elizabeth Morris avenue leads through Springfield, Chatham and Madison to Morristown. A turn to the north at Elizabeth brings one into Newark, the block pavements of which, however, are not particularly attractive to the automobilist, and can be avoided by turning to the left at the outskirts of the city through Irvington and Vailsburg to East Orange.

BY WAY OF FORT LEE.

Another way of getting into this territory is to take the Fort Lee ferry to Undercliff. Fort Lee Hill is quite a proposition. But the hill once climbed, a splendid macadam road (the Hackensack turnpike) leads direct to Hackensack, from which point good macadam roads lead south to Montclair and Orange, north toward Tuxedo and west to Pompton.

There is no section of the United States which offers better roads for the automobile, both as to condition and grades, than Northern New Jersey. In many other sections the thoroughfares from city to city



SAMPLE OF MACADAM ROADS IN NEW JERSEY.



ON THE ROAD FROM MORRISTOWN TO BERNARDSVILLE.

are macadamized and graded, but here one can start and travel all day on macadam, taking in side routes and cross roads almost at random and getting into country so intensely rural that one almost dreads to disturb it with the toot of the horn or the chug of the engine.

NEWARK TO NEWFOUNDLAND.

One of the most attractive routes in this section is from Newark to Newfoundland. The road is out Bloomfield avenue, through Bloomfield and Montclair. Just beyond the Mountain House, at the top of Mountain Hill, is Pompton turnpike, which leads through Cedar Grove and Sig-nac to Pompton. From there the Ham-burg turnpike leads along the river through Bloomingdale, Butler, Smith's Mills and Charlotteburg to Newfoundland. Although somewhat hilly, the grades are not difficult and the road is macadamized the entire distance.

The scenery is a constant delight to the eye. The broad stretches of plain are relieved and broken by mountains of considerable height and much beauty. The rolling foothills are covered with prosperous farms, whose well kept fields are agreeably varied with splendid woods. Along the river beyond Pompton there are many attractive bits of nature, such as waterfalls, rapids, glens and ravines.

Newfoundland is in the heart of the hills. A more delightfully comfortable place than Brown's Inn for a noonday rest and lunch would be hard to find. To the north, approximately 17 miles, the first part of which is macadam road, is Greenwood Lake. To the southwest, beyond Green Pond Mountain, is Lake Hopatcong.

NEWARK TO LAKE HOPATCONG.

The route from Newark to Lake Hopatcong does not offer quite the variety of scenery that is afforded by the New-



"THE ROAD TURNS TO THE RIGHT AT THE OLD 'STONE MILL.'"

foundland route. It is almost a direct road and particularly easy to follow. Bloomfield avenue leads direct through Montclair and into an almost straight road through Verona, Caldwell, Pine Brook, Parsippany and Denville to Rockaway. At this point the canal must be crossed and a sharp turn to the left made; this is followed by a turn to the right, 2 miles beyond, just after recrossing the canal and river. Then the road leads direct into thriving Dover. From that point the road is straight ahead through Kenville, Drakesville and Shippenport to Hopateong Landing. From Verona, for a considerable distance, the road runs through Passaic Valley, a broad plain, 14 miles wide, which in all prob-

bility was the bed of a prehistoric lake. The country is rich in dairy farms. The hills and mountains in the distance save the scenery from becoming monotonous.

Farther on the country becomes rolling and hilly. From Denville south a splendid macadam road leads across Morris Plains, the historic scene of the famous Revolutionary battle. Twice during the war Morristown was made the headquarters of Washington's army. The house occupied by General Washington at these times is now owned by the State and is a museum full of interesting historical relics, which are worth an hour of any American's time. No tourist in this section of the State should leave without visiting the spot. On the hill which rises at the back of the town are the remains of Fort Mifflin, so called because its erection was merely a feint intended to deceive the British army.

From Morristown good roads lead out in almost every direction, like the spokes of a wheel. A beautiful short run is south through Bernardsville to Somerville. The road runs between the hills and is nearly level. There is only one turn between Morristown and Bernardsville—that to the right, at the "Old Stone Mill." An easy climb from the village is well rewarded by the attractions of the beautiful Somerset Inn, situated on the mountain behind the town. The genial manager of this inn, Mr. Tuttle, is enthusiastic in his welcome to automobilists, and this, together with the conveniences of a garage and the natural beauty of the spot, makes it a particularly attractive stopping point for any length of time, from a few hours to a week.

From the Stone Hotel in Bernardsville a road bearing to the left leads through Far Hills to Bedminster. There are a few grades thus far, but from this point on



"THERE ARE MANY ATTRACTIVE BITS OF SCENERY, SUCH AS WATERFALLS, &c."

(after turning to the left to Pluckamin) the road is level and direct to Somerville, 22 miles from Morristown. From there an almost direct road runs back to Newark through Bound Brook, Dunellen, Plainfield, Westfield and Springfield. A circular trip taking in this cross route (and on good macadam the entire distance) would be as follows: Newark to Morristown, 20 miles; Morristown to noon stop at Bernardsville, 8 miles; Bernardsville to Somerville, 14 miles, and Somerville to Newark, 30 miles—a total distance of 72 miles, through beautiful country and over magnificent roads.

The statement goes without saying that this is only one of many possible routes for both straight runs and circular tours, in this section of the State. It is as well, perhaps, to impress on the reader at this point that it is impossible in the scope of any ordinary article to give a complete list of routes in any section. It is only at-

head over macadam roads to Chester. Continue straight on for 5 miles to German Valley and at the hotel turn over the stone bridge and pass on straight ahead to Hackettstown.

From here on the roads are not yet macadamized, but are kept in good condition by the thrifty towns through which they pass, and offer no obstacles to the automobile. Between German Valley and Hackettstown the grades over Schooley's Mountain are rather heavy, but by no means too difficult to be undertaken with confidence.

About a mile beyond Hackettstown a turn to the right takes one through Vienna to Danville. Turn to the left just beyond this town to Townsboro, and there take the right fork along the north bank of the river through Butzville and Bridgeville to Manunka Chunk. From this point the road runs along the Delaware River to the Water Gap, crossing to the west bank (by

though over only fair country road, is perfectly easy for the automobilist. It runs through Otisville, Middletown, Goshen and Montgomery to Newburgh, from which point a return to New York can be made by the Hudson River road on the east bank, or by way of Tuxedo and through Suffern and Ridgewood to Hackensack and thence to New York.

It is in the laying out and planning of the details of these circular trips that the automobile tourist can get the most enjoyment from the sport. The week end trips, calling for an over-night stop, and planned so as to take in picturesque country and interesting points, can be made as attractive as the two weeks' tour. It is surprising what an amount of ground can be covered, and what a mass of information acquired in these short tours, if only they are properly laid out and followed.

If the tourist will only be satisfied to begin in a small way and make these short



THROUGH THE WOODS ON THE ROAD TO TUXEDO.



A QUAIN CORNER NEAR HACKENSACK.

tempted to indicate centres whence the tourist may start on many trips, leaving him to work out the problem of additional routes from maps and guide books. In Northern New Jersey, as in many other sections, this is easily accomplished.

TO DELAWARE WATER GAP.

This article would be incomplete without mention of that much traveled, but always attractive route, Newark to Delaware Water Gap. Famous as a touring route from the days of bicycling, it is just as available and attractive for the automobile. It would be difficult to find a more picturesque spot than the "Water Gap," and inasmuch as the road to it is an easy one for the bicycle or automobile it is not difficult to understand why it has always been and ever will be a popular trip.

Straight out from Newark, through the beautiful old towns of Irvington, Millburn, Springfield, Chatham, and Madison to Morristown, is one of the best and easiest 20 mile runs to be found in the whole country. From Morristown the route is out Washington street (north from the "Green") through Mendham and straight

ferry) at Delaware, 2 miles beyond Manunka Chunk.

Once at the Water Gap a rest may be taken and the peculiar beauties of nature enjoyed for as long a time as the tourist elects. The trip may be continued by going south along the river through Portland, Censerville, Richmond and Martin's Creek to Easton. From this place an enjoyable return trip may be made by way of Still Valley, Bloomsburg, Perryville and Clinton to Somerville, from which point a run to Newark has already been described.

DELAWARE WATER GAP TO NEWBURGH.

To the north of the Water Gap lies Milford and Port Jervis, and the road to these points is even better than that to Easton. The road follows the river, with mountains on either side, through Bushkill to Dingman's Ferry, from which point it is almost level macadam through Milford to Port Jervis. From here to Newburgh on the Hudson is but a comparatively short run of about 60 miles through as delightful a country as can be found in the whole of New York State. The route, al-

though in the nearby territory, becoming familiar with the routine of touring and learning his own vicinity first, he can take up longer tours into more remote sections with much more enjoyment than if undertaken at the beginning of his experience. Touring, like charity, should begin at home, and before starting north, south, east or west, let us exhaust the possibilities of our own localities.

Northern New Jersey is, of course, particularly available to New York, but it is only a step from Philadelphia, either by way of Trenton or Easton. From the north, by crossing the Hudson at Matteawan to Newburgh and following the route through Tuxedo the tourist finds himself in the heart of another ideal touring ground and can turn for enjoyment in almost any direction desired, finding good roads, good stations and good hotels wherever he may wish to go. Tourists from Boston and the East on the way South or West will find it worth while to allow an extra day or two in which to enjoy the scenic beauties and touring conveniences of Northern New Jersey.

LESSONS OF THE ROAD

Horseless Travel in New Hampshire.

(Continued.)

By J. W. LOVERING,

MEETS OWNER OF A SIMILAR CAR.

One thing I have omitted. We met a man in an automobile and as we passed I noticed he had the same make of carriage as my own. We both, with the same impulse I think, came to a stop, got out and shook hands. He made a number of inquiries. "Do you have any trouble with your circulating water?" he asked. This was of interest to me, for it was before I had found where the trouble was in my own system. He continued: "I have just had a h— of a time in getting mine started." I inquired how he at last accomplished the act and he replied that he did not know, as there were no general directions except to keep at it, which had been my experience to a dot.

After dinner we pulled back through adjoining towns to Exeter and a little way out from there, as we neared the crest of a hill, we came instantly upon a team. The driver was on the ground holding the horse by the bit and nearly

FRIGHTENED OUT OF HIS SENSES.

A lady and two children, who were with him, were on the wall by the side of the road. How they managed to be so well prepared for us has always been a mystery. I jammed on the brake, stopping both the carriage and the engine instantly, as the horse was dancing pretty badly. I feared that if I left the carriage the brake might slip, as we were on the steepest part of the hill, so my wife got out, went ahead and took charge of affairs. As the man seemed paralyzed with fear she told him to lead the horse through a pair of bars, which by good fortune were at hand. When I started the engine I thought the horse would clear himself from the wagon, even at that distance, so he led him into the pasture—some 200 feet or more further. In starting it was necessary to release the brake, apply the driving clutch, throttle the engine and steer simultaneously, which required the most of my attention. As I got to the top of the hill my wife was returning, and the horse was still jumping over the rocks in the pasture. We went along, glad to be rid of the worst horse experience we have ever had.

PIN DROPS OUT AND STALLS ENGINE.

Recently one pleasant Sunday afternoon, while on a trip with my wife, as usual we were within about a dozen miles of home, going along at a fair clip, when without an instant's warning the engine gave two or three spasmodic explosions and came to a full stop. It was an entirely new feature for both cylinders to give up at the same time. I got out and began to make an examination. After looking everything

over carefully and finding nothing out of place, I took out my crank, which I now carry for just such an emergency (this I will explain later) and gave the engine a turn. It was dead and appeared never to have had any life. The compression was good. So I primed the cylinder to see if the charge would explode, but it did not. I next tried the spark, and as I disconnected the wire from the spark plug it gave a flash. Having never had many sparking troubles I hardly knew whether this was the proper thing to do or not; but after turning the engine over and finding that it would do this anywhere during the revolution, I came to the conclusion that it was not. Surely there must be a short circuit somewhere. It was growing dark and there were a dozen miles of narrow, sandy road between us and home. I told my wife that I thought we were at last up against the "real thing." She suggested that we go to the nearest house, get someone to carry us home and send our team out to get the carriage home in the night. I did not seem to appreciate this proposition and was about to tell her so, when I discovered that a small taper pin had worked out and was gone from the igniter lever, allowing this lever to remain in contact with the spark plug and so causing the short circuit. My wife was walking up and down the road, trying to find the pin, an utter impossibility. But as I carry a small machine shop I very soon had a new pin fitted. The engine started on the first turn and we picked our way home through the darkness.

WATER TANK SPRINGS A LEAK.

Soon after this experience I made a journey of about 40 miles, on which occasion the carriage was disabled in its own stall. It was a close shave, and I am beginning to think the time may yet arrive when I shall be forced to go alter it in the night. Everything went well on this trip until, chancing to see a friend when within above 5 miles of home, I stopped to talk a minute, and while doing so learned that my water tank was leaking badly. I pulled on, leaving a little wet streak along the road. Filling up the tank once on the way, I made the best time possible and reached home all right, but I had no more than done so when there was a fizz and every drop of water in the tank and circulating system was running across the floor.

I removed the tank and found a split about 6 inches long running across one end from corner to corner and in one of the seams. I am now having a heavy copper tank made to replace this galvanized iron one. The metal workers tell me that a tank made from galvanized iron is very shortlived, and my next experience probably will be with the gasoline tank.

FAITH IN THE OLDER BUILDERS.

It is far from my intention to cast any reflection on the makers of my machine for the weaknesses revealed in it, for I know by experience that they are more

than willing to do anything in their power to correct any imperfections that may exist. But if these older makers have been unable to correct all the faults, what must be said of some of the makers who have only been in the field a short time?

Since writing the above I have had a new experience. Having got the new tank put on, I made a trip of 20 miles to a nearby city, putting my carriage up at a stable while I attended to my business. When ready to return I found it impossible to start the engine. After cranking several times I began to hunt for the trouble. The compression was good and so was the spark. I primed the cylinder, and on turning the engine over the charge ignited all right. Once it ignited several times simultaneously, giving a double and twisted kick and throwing the crank from my hands onto the floor some 10 feet away. This little trick made the crowd which had already gathered move back, one of them remarking that it was an electric and the fuse had burned out. An exhibit of this kind is to a lively stable what the circus is to the small boy.

INLET VALVES STICK.

I soon located the trouble. Both inlet valves were stuck down; in fact, they seemed to be frozen to their seats, and it took me some time to move them in the least; but finally by using gasoline I got them limbered up. The engine then started, the crowd dispersed and I got home. After letting the engine cool I examined these valves and found them stuck fast again. Removing both the seat and valve intact, I found the stem of the valve only coated with a thick, tarry substance, the valve itself and the seat being clean and bright. I ground down the valves, although I did not think they required it, put in a stiffer spring and made another trip with the carriage. It ran well, but the valves are fast on their seats again.

I have consulted the makers, who say this substance may come from the lubricating oil or the gasoline, having been put into a barrel containing gum, which when dissolved with the gasoline will cause this trouble. This trouble, they stated, they had had with their carburetors, but never with the valves. Or, again, the trouble may be due to the excessive use of cylinder oil or to the quality used.

I have taken my carburetor apart to see if there was any of this deposit there, but found it clean. As I am using the same grade and amount of cylinder oil recommended by the makers, and the gasoline is from the same tank as heretofore, same not having been replenished, it seems as though the trouble must be somewhere else. I shall find out where the trouble lies probably by the time a new symptom develops, which will be in the near future.

SUMMING UP

The whole I will say that my carriage is neither better nor worse than I expected. There are many things about it that might be and ought to be improved, and I be-

lieve if the makers would visit, say fifty persons, who had been using their automobiles for a year or more, they would return, with many new ideas and much food for reflection. I have traveled only between 700 and 800 miles, have always come home without any assistance, have enjoyed the trips very much and have had no tire trouble whatever, with the exception of leakage around

THE VALVE WINDINGS,

which showed itself so badly before I had run 200 miles that every tire required pumping up every trip.

Only about one-half the winding stuck through the felloe, the rest being below and out of sight (a gross oversight). I concluded it would be a whole day's work for me to remove these tires and rewind them, so I made a little tool which stopped this leak very effectively. Taking a pair of stout blacksmith tongs and clamping the jaws together firmly I drilled a hole through them, about one-sixty-fourth inch smaller than the winding, so that when the tongs were opened it left one-half of the hole in each jaw. Applying this instrument to the winding I gave it a squeeze, turned it around a little and repeating the operation upon the winding wire, making as good a job apparently as if the tires had been taken off and the stems rewound, for they have shown no leak since.

There is one important thing the makers neglect in their instructions, and that is to give information regarding the little troubles that are always happening to their outfit. They seem to assume that the carriage is going into the hands of a natural mechanic.

I have received more real practical information by talking fifteen minutes with persons who had carriages of the same make as my own than I have ever derived from the printed instructions furnished me. Had I possessed no mechanical ability I am well satisfied a "for sale" ad would have appeared in your paper long before this.

IMPROVEMENTS AIDED.

I have added several improvements to my machine. There being only one brake, and that on the differential, I fitted hub brakes to the rear wheels, operating them by a pedal coming up through the floor directly in front of the throttle stem, which also comes through the floor, and at the proper distance from it, so that when the heel is on the throttle the toe will rest on the brake. When circumstances require a sudden stop I can apply this brake instantly. The heel slipping off the throttle at the same time cuts off the power without any mental exertion. Furthermore, the toe being somewhat raised on this brake puts the foot in a natural position, whereas previously the toe was on the floor and the heel on the throttle, some 2 inches higher, a position very tiresome if continued for any length of time.

Another good feature about this arrangement is that the heel never slips off

the throttle, as often happened before, for the foot is kept in position by the brake pedal. This brake I seldom use, but it gives me as much comfort as would an insurance policy in my inside pocket.

EXHAUST FOR FOOT WARMING.

As cold weather approached last fall I found that the automobile was a mighty cold thing to ride in, the makers having used every effort to leave all the heat generated along the road while the driver is suffering for the want of it, so I removed a board, about 6 inches wide, from the floor directly beneath the feet and running clear across the carriage, and made a flat hollow chamber the exact length, width and thickness of the board removed. When this was in position one would not know it was not a part of the original floor. Underneath and at each end I had a three-quarter inch brass pipe fitting soldered. One of these I connected to the muffler by a three-quarter inch pipe with a stop cock in it. The chamber being made from No. 14 iron is as stiff as the floor itself. The floor being about three-quarters inch thickness leaves the chamber somewhat over five-eighths inch inside. The engine throttle and the stem for ringing the bell were in the way of this chamber and had to be let through it. This I accomplished by drilling two holes, tapping with a three-eighths inch pipe tap, screwing through a piece of three-eighths inch pipe, sawing off and leaving both ends flush with the top and bottom faces respectively. I also put in several hollow stay bolts, of a smaller size, so as to be able to bolt the chamber down. The arrangement is a success, as it keeps the feet warm, and with the addition of a lap robe warms the whole body, and when not needed it can be shut off.

STARTING FROM THE SEAT.

It has always seemed to the writer that there was great need of some arrangement for starting a gasoline engine from the seat, instead of getting out and walking around the carriage hunting up the crank.

I have seen several of these arrangements, but none that impressed me very favorably.

It does not require very much muscular effort to start an engine of the size commonly used in an automobile, provided you can exert this power in a rational way and while in a natural position. Drawing a lever toward you, while sitting on a seat, having the lever the right distance away and of the proper height would seem a practical arrangement, using the foot in pushing a lever from you, as in using the pedal brake. In either of these positions one could easily exert all the power required. I have just completed such an arrangement, which is very simple, has no clutches or gears and will neither break nor yank should the engine kick. With two or three pulls of this lever I can start my engine after stopping same for frightened horses, and when not in use it is up against the dash out of the way. In fact

it is an ornament to the whole outfit. So far it is a perfect success, but not having used it very long I will not give a description of it at this time.

NEW LIGHTING SYSTEM.

Before I close I wish to quote an article from the *Acetylene Journal* on acetylene gas lighting which I think will be of interest to users of automobiles.

After describing the wonderful affinity acetylene and acetone have for each other, the article continues:

"A steel tank or cylinder that is 6 inches in diameter and 30 inches long, packed from end to end with porous bricks or asbestos disks, which have the properties of eliminating all dangers from explosion, is filled with acetone equal to four-tenths of its cubic capacity, which is absorbed by the bricks or asbestos disks. If charged with acetylene at 240 pounds pressure to the square inch this tank would contain 78 cubic feet of gas, which is sufficient to light ten 25 candle power lights for over fifteen consecutive hours."

It seems that here is the ideal thing for automobile lighting. A cylinder one-fourth the size mentioned would be capable of maintaining two or three powerful lights for over eighteen hours. They would always be ready to light without the bother of bringing carbide and water together, as has to be done in the present acetylene lamps. There would be no after generation of gas and no lamps to clean.

Of course, there would have to be a suitable reducing pressure valve to feed the gas to the tips at the right pressure, but such valves are today made that work to perfection.

With an arrangement of this kind a carriage could be simply piped, and a fresh cylinder connected when needed, and the empty one recharged at small expense.

A Tour in Southwest Pennsylvania and West Virginia.

By E. P. HONGES.

Three years ago I tried to buy a gasoline car from a gasoline engine factory in New York, but the incentive of \$1,800 could not purchase me anything but a Benz car, then in ocean transit and of unknown power. This I did not take.

This year of 1903 has produced such practical automobiles that I was tempted last month to invest in a stout 6 horse power runabout made in Detroit. I think I had every runabout represented in Pittsburgh under trial on the terrifying grades of that hilly city. South Negley avenue was the bête noir which made the demonstrators look grave. It is an unpaved yellow clay road, smooth enough in summer, but steep enough to make two horses do their best. The incline is about a quarter of a mile long. My runabout in question went up without hesitating on the second and only slow speed forward.

As my summer house is here in the foothills of the Blue Ridge Mountains, on the

picturesque Cheat River, 90 miles south of Pittsburgh, I did not think it advisable to run my new and almost untried machine over the very bad roads in that direction. The demonstrator ran down the 5 mile boulevard to the wharf in Pittsburgh, where we put the car on board the great sidewheel river steamer leaving for Point Marion at 4 p. m. I taking passage on the same boat. We were ordered by the captain to drain the gasoline from the tank, and then the negro roustabouts, picturesque looking ruffians in motley rags, pushed the auto on the forward gunnel, where it was subjected to various bumps and comments by the curious onlookers.

Next day we arrived at the town of Point Marion, where I was disheartened by the mate, who said the "thing" would never run up the wharf grade to the street. As we were out of gasoline we compromised by having the said roustabouts push her up to the level, where I lost no time in filling my 8 gallon tank with 76¢ gasoline. A friend got in beside me and we cranked half a dozen times and started up the street and out of town along the river road, a ratty affair, with many ups and downs, like the undulations of a serpent's back. We got home safely and put the car in the neat house I had built at a cost of \$15.

Next day my wife and I started on a day's excursion along the left bank of the picturesque Monongahela River, of which the Cheat is a tributary. We followed the river 1 mile and turned up Stony Creek hollow to strike the good road on top of the lofty hills, where we were told that our car could roll pleasantly into Morgantown, W. Va., 14 miles south. The creek road led us between two lofty wooded steep hills, and the dank gorge was exceedingly quaint and untraveled.

The short stretches of good road allowed us to speed up, and I cannot express the delightful sensation of skimming along at a 25 mile gait for the first time. Here and there we passed old fashioned houses deep in the surrounding verdure. The people as a rule came running out in amazement to see the hitherto unknown monster: dogs followed us barking vociferously, and the numerous cows grazing along the road had not sense enough to turn out, but labored along ahead of us greatly terrified.

On this trip I learned the mysteries of the late and early spark and the successful manipulation of the clutches. Our slow speed clutch band slipped on a dangerous hill and the band brake refused to hold. My wife uttered an exclamation of terror, but I had presence of mind enough to turn my head and run down backward for 20 feet, where we stalled against the inner bank of the road. By tightening the bands and putting gasoline in the brake friction I remedied matters and we started, all going well until we descended a long hill to the river bank, where the road was a succession of ruts a foot deep and full of

slippery mud. Our hind wheels dropped into one of these and there they remained for about an hour.

Every time we started the motor and threw in the slow speed the wheels revolved ineffectually but merrily in the mud, my poor wife laying stones under them, with a look of disgust on her face, and bespattered with yellow mud from head to foot. A farmer came along about this time and cheerfully put a fence rail under the rear axle, thus getting us on terra firma again. We pushed on earnestly for 5 miles, stopping once to fill our 2 gallon tank with water. The water lasts us now never more than 5 miles and boils promptly ten minutes after starting, owing to the continuous hills in this region.

At 4 o'clock we turned about, making a 9 mile run without mishap, when we heard a report like a rifle shot and saw a puff of dust behind the wheels. My wife insisted that the smoke on the edge of the neighboring thicket was from a rifleman concealed behind a bush. As we were running about 23 miles an hour we did not slacken our speed, but passed the danger signal as fast as an advanced spark would carry us. We then stopped to talk the matter over and found that our rear right hand tire was gashed from a glass bottle and all the air had mingled with the breezes outside. It was then nearly 5 o'clock, and we were in a wild mountainous region, 12 miles from home by the good road. Only two hours till dark and the outer tire weak from the long wound across it.

I jacked up the offending wheel, pulled off the tire after many struggles and found that the inner tube was too far gone to patch. We tried it, however, only to find the tire flat again after we had started. Out again we got and put on the extra inner tube which I held in reserve. By tying plenty of tape around the tire we made it serviceable.

Starting again we made a rapid run for 6 miles, passing successfully the broken beer bottle that had caused us so much sorrow. As the high speed friction cone began to slip I dismounted and wrestled with it for fifteen minutes, screwing up the face plate to the cone engaged on the direct drive properly. We then went up hill, where the grade was not steep, on the high speed, reaching home safely, tired to excess, but full of enthusiasm and ready to go again.

The cost of this trip was somewhat excessive: Four gallons of gasoline, one inner and outer tire, a lady's chatelaine bag containing a Mexican pocketbook with \$8 in it, and last, but not least, a great deal of patience. Sum total loss, irrespective of the lost patience, \$34.

Fortunately experience teaches and we fully expect to travel on less mileage next time. This trip has demonstrated to me two incontrovertible facts, viz, that we need punctureless tires and more than a 6 horse power engine to tour in the wilds of West Virginia and Southwestern Pa.

The Gordon Bennett Cup Race.

The race for the International or Gordon Bennett Cup was run on the course in Ireland on Thursday, July 2, under favorable conditions and was won by M. Jenatzy of the German team, in 10h. 15m. total time, or 6 h. 39m. net time for the 368 miles 750 yards.

The course was pronounced a bad one by all the racers. Mr. Mooers, one of the American competitors, said before the start that at some places where the roads had been oiled there were deep hollows in the roadbed which were filled with dust and thus hidden from view, while in other places the roads were very dusty. Jenatzy, of the German team, after the race pronounced the course as bad beyond conception, both as regards the roadbed and the many sharp turns. The weather was very fine in the early morning; later, along during the forenoon, it threatened rain, and at the time of the finish there was a heavy downpour.

The attendance in general was not as big as was expected, and the club enclosure was not at all crowded. Nevertheless the Irish jaunting car drivers demanded and received excessive prices for transporting people between Kildare and Ballyshannon.

All the twelve representatives of the four clubs of Great Britain, France, Germany and the United States respectively were on hand and started. The teams were composed as follows:

Great Britain—S. F. Edge (Napier car), Charles Jarrott (Napier), and J. W. Stocks (Napier).

France—Chev. René de Knyff (Panhard), Henry Farman (Panhard), Fernand Gabriel (Mors).

Germany—Camille Jenatzy (Mercedes), Baron de Caters (Mercedes), Foxhall Keene (Mercedes).

United States—Alexander Winton (Winton), Percy Owen (Winton), L. P. Mooers (Peerless).

The roads leading from Dublin to the starting place were crowded with vehicles of all descriptions during the early morning hours, from 2 o'clock on. The roads were very dusty and the procession of vehicles stirred up a continuous cloud of dust. The starting began at 7 o'clock sharp, at which time S. F. Edge was sent across the line. Edge was last year's winner of the cup and a favorite with many of the spectators, and as he went off he was loudly cheered by the crowds. Seven minutes later De Knyff, of the French team, was started; fourteen minutes after 7 Owen, of the American team, and twenty-one minutes after 7 Jenatzy, of the German team. A number of the contestants met difficulty in starting, owing, no doubt, in most cases, to the absence of low gears. Thus, Edge, Owen, Stocks and Mooers are reported to have made poor starts. Mooers was extremely nervous, and is claimed to have forgotten to take off his brake before applying the clutch. [This should be impos-

sible, as usually clutch and brakes are interconnected, but possibly the interconnecting mechanism had been taken off to lighten the car.—Ed.] His mechanic stepped out to help the car start by pushing, and then it was noticed that the brake had not been released. Farman's motor stopped just when the signal to start was given, and something went wrong with the mechanism of Winton's car, which kept him and his mechanic at work and detained him for fifty minutes after his official starting time. The stewards of the race counseled Winton to abandon the contest, but he insisted on starting, and finally got away amid the cheers of the crowd. According to program, he was to have been third to start. The best start was made by Jenatzy, whose machine went off at top speed like a bombshell and was wildly cheered by the spectators.

ACCIDENTS.

The first accident of which notice was received at the grand stand was to J. W. Stocks, of the English team. At a turning of the road near Castle Dermot he mistook the course and crashed into a hedge. One of the front wheels was smashed and the entire front of the car considerably damaged, which put him out of the race. This happened on the first round, and Stocks never passed the grand stand after the start.

The steering wheel of Jarrott's car got out of order near Stradbally and the car crashed into the bank and was completely demolished, and Jarrott and his mechanic thrown out. Jarrott had his collar bone broken and was otherwise badly bruised, and his mechanic was crushed beneath the car, according to an early dispatch. Later reports do not refer further to the condition of the mechanic. Soon after Jarrott had come to grief he was passed by Baron de Caters, who slowed down and offered assistance, which Jarrott refused. When De Caters passed the grand stand the next time, where the news of Jarrott's accident had already been received, he slowed down and informed the officials that the accident had not been very serious.

Baron de Caters broke his rear axle to miles from the finish in the last round, when he seemed likely to gain second place. Mr. Mooers retired from the race between Maryboro and Athy, in the second circuit, owing to some derangement of his transmission gear. In the first circuit one of the tires came off Keene's machine, causing a delay of 20 minutes. It was then noticed that the rear axle was cracked, but Keene kept on and made three more rounds at good speed, when the control officials decided it was unsafe for him to continue. Keene's time for the first round was the best of any.

The first to complete the first circuit was Edge, who passed the grand stand at 8:23. De Kniff followed at 8:34 and Owen at 8:49. Owen was followed at a short distance by Jenatzy, who was then trying to pass the American. As the two flew under

Contestant.	Start.	Second Stage.	Third Stage.	Fourth Stage.	Fifth Stage.	Sixth Stage.	Seventh Stage.	Finish.	Total Time.
Edge.....	7:00	8:23	10:00	11:56	1:51	3:35	....	Finished late.	
De Kniff.....	7:07	8:34	10:06	11:25	1:04	2:25	3:57	5:34	10h. 27m.
Owen.....	7:14	8:49	10:24	....	....	....	....	....	....
Jenatzy.....	7:21	8:49	10:20	11:37	1:09	2:30	4:02	5:36	10h. 15m.
Jarrott.....	7:28	8:54	Accident in second round.	....	....	....	....	....	....
Gabriel.....	7:35	9:05	10:25	12:06	1:40	3:00	4:45	6:20	10h. 45m.
Mooers.....	7:42	10:10	Retired in second round.	....	....	....	....	....	....
De Caters.....	7:49	9:18	10:35	12:16	1:54	3:13	4:52	Out.	....
Stocks.....	7:56	Accident in first round.	....	....	....	....	....	....	....
Farman.....	8:03	9:28	....	12:27	....	3:21	4:58	6:30	10h. 27m.
Winton.....	8:10	10:24	1:28	....	....	....	....	....	....
Keene.....	8:17	9:40	11:35	Withdraw.	....	....	....	....	....

the arched grand stand there was terrific excitement among the spectators, but Owen was soon lost in the dust and Jenatzy was not seen passing him. Jarrott passed the grand stand the first time at 8:54 and Gabriel at 9:05. The last mile before the grand stand was specially timed. It was done by Gabriel in 52 seconds, by Foxhall Keene in 53 seconds and by Jenatzy in approximately the same time, and it is calculated that when the latter attempted to pass Owen he was running at approximately 75 miles an hour.

Baron de Caters passed at 9:18, having passed Mooers. Foxhall Keene passed at 9:40, having passed Mooers and Stocks, who had retired. Next to Keene's, Edge's time was best in the first round.

During the last rounds the three French racers and Jenatzy kept the lead, while Edge was dropping far behind, and Winton only completed his fourth circuit.

Jenatzy started fourteen minutes after De Kniff and finished two minutes later, so that he won by 12 minutes. He estimated that his maximum speed had been 135 kilometres per hour, or about 85 miles. The unofficial average for the entire course is about 54 miles per hour. Jenatzy is a Belgian, and became first known in the racing world as the constructor of a torpedo shaped electric racing machine, which he named the "Jamais Contente," and which was the first motor road vehicle to attain an official speed of a mile a minute. He also competed in the Gordon Bennett Cup Race in 1900 with a Belgian machine, but broke down and did not complete the race.

When Jenatzy found that he had won the race he was highly elated, and barely had the race committee taken charge of the machine, weighed and examined it when he rushed off to the temporary telegraph station to send off dispatches. The machine in which the victory was won belongs to Clarence Gray Dinsmore, an American, and is a 60 horse power Mercedes.

The arrangements are reported to have been very complete and to have worked admirably throughout the race. The course was guarded by between 3,000 and 4,000 policemen and was kept absolutely clear. A special telegraphic cable had been laid between Ballyshannon and Dublin, and thirty-five telegraph operators were at work from 5 o'clock on.

The international cup passes therefore into the custody of the German Automobile Club, while the Scott Montague prize for best team work goes to the Automobile Club of France. The showing of the American team was probably the poorest of all. Winton and Owen had trouble with their motors and Mooers had trouble with his transmission gear, the specific nature of the trouble not being stated. Foreign experts are said to consider the American machines built too light.

The course resembled a figure 8 and was 93 miles in length. The larger or western loop was covered four times, and the smaller loop three times, so the race naturally divides into seven stages each, beginning at the starting place near the grand stand. The unofficial times of start in the various stages are given in the annexed table. It will be noticed that in the fifth and sixth stages De Kniff and Jenatzy made exactly the same time.

Following are the official net times for the five machines which finished the race: Jenatzy, 6h. 30m.; De Kniff, 6h. 50m. 40s.; Farman, 6h. 51m. 44s.; Gabriel, 7h. 11m. 33s.; Edge, 9h. 18m. 48s.

Jenatzy's average speed over the whole course, excluding stops, is 49½ miles, which is a new record for the Gordon Bennett Cup race.

On July 3 the leading cars which competed in the Gordon Bennett race were exhibited in Dublin and were seen by large crowds. Jenatzy and De Kniff lunched with Secretary Ordé, of the A. C. G. B. I., on that day and afterward were besieged by admirers. Jenatzy claims to have descended a hill on the common portion of the two loops at about 90 miles an hour. He said: "The first time I negotiated it I saw a big rut, got my wheels in it and stayed there and swung around the corner at the end in safety and at top speed. The seventh and most critical time I lost the rut; but, still hoping to find it, I kept up the speed, failed to get the rut and had to take the corner anyhow. I had never been so near heaven."

Popular feeling in Ireland is reported to be against the holding of any further races of this kind, as they interfere too much with the regular conduct of affairs, not to speak of the attending danger to life and limb. All the London dailies are also very outspoken against further racing on the



GROUP OF PARTICIPANTS IN THE CHICAGO-MAMMOTH CAVE RUN.

highways. It is reported that shortly before the race the following notice was liberally distributed among farmers living near the course: "Upon seeing a motor do not attempt to cross the road; if you do you'll be dead before you get to the other side." This warning may have been advisable under the circumstances, but surely such a statement is not calculated to reconcile the peasantry to automobiles.

The Chicago-Mammoth Cave Club Run.

The members of the Chicago Automobile Club who started on a 1,000 mile club run on Thursday, June 25, met with many difficulties early in their trip, and quite a number dropped out before reaching Indianapolis. The tourists spent Thursday night at Cedar Point Hotel, Cedar Lake, and left that place at 7:30 the next morning. They expected to take dinner at Rensselaer. The weather was delightful, but the roads were heavy. A great deal of sand was encountered, and the run was made by easy stages. There were a number of small accidents, and delays were caused by punctured tires and other mishaps. The party took dinner at a farm house just north of Rensselaer.

On resuming the run, the Chicagoans went direct to Lafayette, changing their

route so as to parallel the Monon Railroad. The intention to detour by way of Delphi was abandoned. The party was much later in reaching Lafayette than was expected, arriving only at 11 p. m. After the cars were put up the gentlemen of the party proceeded to the Lafayette Automobile Club, where they were met by a delegation of the Indianapolis Automobile Club. This delegation comprised five cars and fifteen people, including Mayor Bookwalter, of Indianapolis, and most of them arrived about 4 p. m. A buffet luncheon was served at the club and Mayor Samples and other city officials had been invited to meet the representatives of the two automobile clubs.

Four of the machines arrived at Indianapolis on Saturday, June 27, and the tourists were given a dinner at the Columbia Club in the evening. The party arriving consisted of W. R. Smith and wife, J. William Thorson, A. Scott Ormsby and wife, John E. Fry, F. H. Davis, J. B. Burdette and wife, and J. E. Stevens and wife. No accidents were encountered between Lafayette and Indianapolis, but the tires on the machine of J. B. Burdette suffered many punctures and needed renewal. Five machines with fifteen persons arrived at Richmond at 5 p. m. on June 30, two days behind schedule, owing to bad roads and bad tires. Four of these machines passed through Cincinnati on July 1 at noon and were delayed

another half day owing to Burdette's tires. From Cincinnati the tourists went up the Ohio River by boat to Maysville, Ky., and intended to continue their trip from that town, going first to Lexington on Thursday morning. The going encountered between Richmond and Cincinnati was the best on the trip, as the roads were in good shape. The members of the party are enjoying the trip and have been very courteously treated along the road.

A party of local automobilists left Cincinnati at 2 a. m. on June 28 and arrived at Richmond at 5:30 p. m., where they met the Chicago automobilists.

Automobiles and the Temperance Movement.

The Most Rev. Dr. Foley, Bishop of Kil-dare, addressed a letter to the priests of his diocese urging them to impress upon their people to abstain from the use of intoxicating drink during the Gordon Bennett Cup race, as otherwise, he feared, the caution of the organizers as to crossing roads might not be respected. It is also reported that an Englishman thinks that the automobile bids fair to rid that country of the curse of drunkenness, "for," he says, "surely no one will drink to excess if he is aware that on his way home he may be run down by a motor car." He would, therefore, strongly advise against limiting the speed of motors.



PARTICIPANTS IN CHICAGO-MAMMOTH CAVE RUN AT LAFAYETTE, IND.

NEW VEHICLES AND PARTS.

The 25 Horse Power Maudslays Gasoline Car.

Among English gasoline cars that of the Maudslays Motor Company, of Coventry, is undoubtedly one of the most original designs, embodying novel features in every part of the power equipment. The car made a very creditable record in the Reliability Trials of the A. C. G. B. I., in 1902, in which it earned a silver medal, and is considered one of the leading makes on the British market. In general appearance the car much resembles other makes with vertical engine in

formed with a large opening on either side of the cylinders, which openings are closed by aluminum cover plates A held in place by machine screws.

The inlet valves B and the exhaust valves C are of the poppet type and open directly into the cylinder. The valve seats are in the form of cages, which are slipped from above into suitable openings in the cylinder head and clamped in place against shoulders in the openings by means of annular externally threaded pieces. Both inlet and exhaust valves are mechanically operated by means of cams on a cam shaft D running across the cylinder heads through the prolonged centre lines of the cylinders. The cam shaft, which carries

in opposite directions. By means of the brackets N the casing is hinged to brackets rising from the cylinder heads, and the brackets M serve to securely hold the casing in the operating position by means of the pivot bolts L. That the casing may be freely swung around the hinged joint of the brackets N, the vertical shaft I is provided with a universal joint O, and the point of intersection of the two pivots of this joint lies in the centre line through the hinge pivots of the brackets N. In Fig. 3 the entire case E is shown swung out of the way, thus giving ready access to any of the valves.

Referring to Fig. 2, lateral openings in the valve cages establish communication

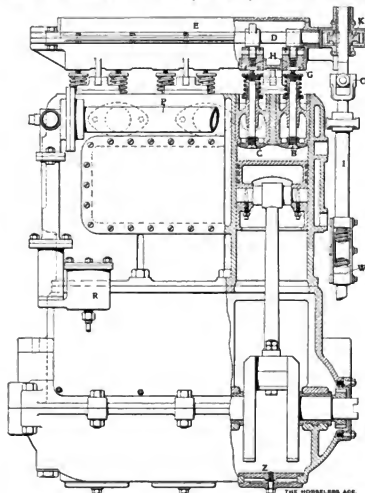


FIG. 1.

front and clutch gear transmission, and we shall confine ourselves in this article to a description of the novel features of the engine and transmission.

THE ENGINE.

The engine is a three cylinder vertical one of 25 horse power. The cylinder bore is 5 inches and the stroke 5 inches. The three cranks are set at 120 degrees, and to further insure perfect balance the crank arms are made with counter weights, as shown in Fig. 2. The crank shaft has four separate bearings, two between cranks and one at each end. The three cylinders are in one casting, together with their heads and jackets. The jacket is

six cams, is inclosed in a housing E. The cams act upon the valves through the intermediary of cam rollers F, sliding blocks G and adjusting screws H.

The horizontal cam shaft D is driven from the engine crank shaft through a spiral gear train between the crank shaft and a vertical shaft I, this vertical shaft and a set of spiral gears K between shaft I and shaft D.

In order that the valves may be removed from the cylinders the casing E must first be moved out of the way, and that this may be accomplished as readily as possible the casing is provided with two sets of brackets M and N extending

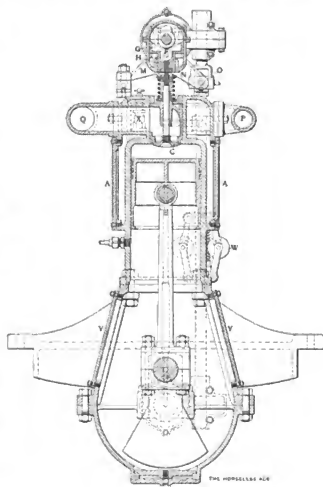


FIG. 2.

with the inlet and exhaust passages cast in the cylinder heads. The inlet passages are shown in this figure at the right and exhaust passages at the left, and it will be noticed that these passages are entirely surrounded by the water jacket. Cast inlet and exhaust pipes P and Q run across opposite sides of the cylinder and communicate with all the respective passages, being secured to the cylinder wall with flange joints.

The carburetor R is located close to the engine and draws warm air from around the exhaust pipe through the tube S. A regulator T permits the variation of the temperature of the air sucked in at will.

The intake pipe rises vertically from the carburetor and connects with the horizontal intake pipe P through a throttle valve U. The latter is provided with a lever arm V which connects to the centrifugal governor W on the vertical shaft I. The speed of the motor is thus governed by throttling the charge.

The ignition is on the jump spark system, and one of the spark plugs is shown in dotted lines at X in Fig. 2. The commutator is placed on the dashboard of the car and is driven directly from the cam shaft D.

The lubricating system is of special interest. By means of a small force pump oil is forced into the hollow crank shaft and each bearing is fed through a radial hole in the journal. The connecting rods themselves are hollow, and the oil passes through right up to the piston pins, and also sprays on to the cylinder walls. After being flushed through the bearings it falls to the bottom of the crank chamber and is drawn through a filter to the pump, by which it is again forced on its way.

The crank case is provided with supporting brackets and with two large doors Y Y at the sides, through which all internal bearings may be adjusted and even the pistons be withdrawn, the connecting rods having first been removed through the opening at the bottom of the case closed by the plates Z. This latter feature is claimed to be peculiar to this engine.

THE FRICTION CLUTCH.

Figs. 4 and 5 show two views of the friction clutch, which is of the conical type and is built together with the flywheel. The engine crank shaft A is provided just outside the bearing with a sharp ridge B, which flings off the oil working out through the bearing and causes it to return into the crank case, at cap C, a return passage into the crank case being provided to this end. The

crank shaft is also provided with a flange D, to which the flywheel E is bolted. Upon an extension of the crank shaft is mounted the sleeve F, with a flange to which the clutch cone G is bolted. The sleeve is provided with a bronze bush having a sliding fit on the crank shaft extension. To the sleeve F is secured, by means of small machine screws, the driving block H, and to the latter the sliding collar K, by means of four screws L. The sliding collar has a ball bearing J upon it by means of which the clutch is thrown out of gear.

Surrounding the driving block H is a coiled spring L abutting at one end against the flange to which the clutch cone is secured, and at the other against a spring adjusting nut M screwed over the collar N. The latter is provided with two internally projecting lugs O, opposite each other, which connect by two rods P to similar lugs on one of the two disks of a ball bearing R. The other of the two disks is secured to the engine crank shaft.

The ball bearing and rods P hold the spring stop M in place against the pressure of the spring, preventing all longitudinal motion. The ball bearing takes up the end thrust due to the spring, and as all the parts move together when the

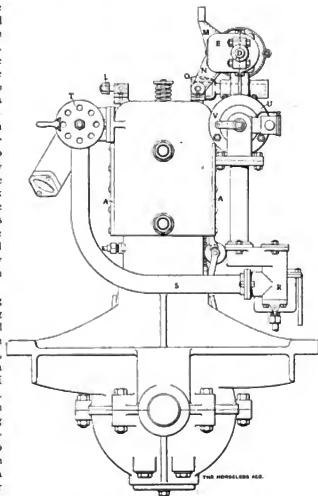


Fig. 3.

clutch is in engagement, all end thrust is then confined within the clutch and does not produce any unusual friction.

The driving shaft S is provided with two arms which engage with the driving block H, and has keyed to it one part T

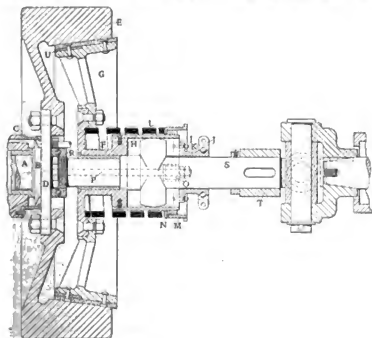


Fig. 4.

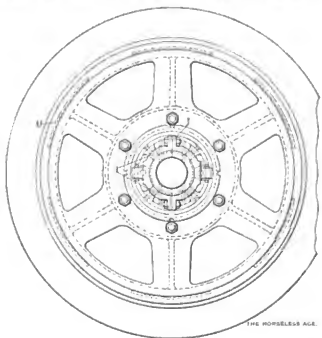


Fig. 5.

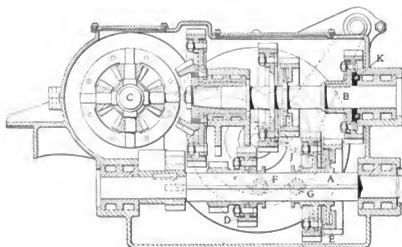


FIG. 6.

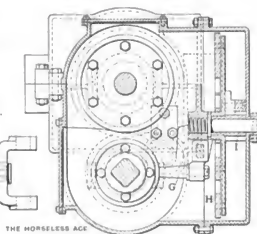


FIG. 7.

of a universal joint through which the power is transmitted to the change gear. The engine bearings and change gear bearings need therefore not be in perfect alignment with each other to prevent binding.

The cone G is faced with leather and below the leather are placed a number of flat steel springs U to insure a more gradual gripping of the clutch.

In Fig. 4 one of the lugs on the ball bearing and the screws connecting the driving block H and collar K are shown in the plane of the section, out of their correct position, to make their location more plain.

THE CHANGE GEAR.

Figs. 6 and 7 show two sections through the change gear box. The latter is of

aluminum and contains two parallel shafts disposed vertically one above the other. The lower shaft A is squared and has mounted upon it two pair of sliding gear pinions. The upper shaft B is made with four flanges to which are bolted four gear crowns. In addition to the longitudinal shafts the gear box contains a cross shaft C, which is driven by bevel gearing, and which also contains a balance gear. The ends of the cross shaft project on either side of the gear case, and are connected by double claw clutches to short shafts on which the sprocket driving pinions are mounted. It will thus be seen that universal connections are used very liberally in this car.

The two pairs of sliding pinions D and E are moved by means of two shifting

forks, F and G, respectively. These forks receive their motion through a grooved cam plate H, which is turned by means of a spur pinion I and toothed sector J.

The change gear gives four forward speeds and a reverse, all by means of a single lever. The end thrust of the bevel gears is taken up by the ball bearing K. All the gears are cut of steel. The gear is certainly very compact for a four speed forward and reverse.

General Delivery Wagon.

The accompanying illustration shows a delivery wagon just constructed by the General Automobile and Manufacturing Company, of Cleveland, for Barie Brothers, Saginaw, Mich. The mechanical features of the wagon differ in no way from the General runabout. Power is supplied by a two cylinder balanced type engine, using gasoline vaporized by an adjustable diaphragm carburetor which, it is claimed, automatically feeds the proper amount of fuel after once being set, regardless of all changes of speed. Lubrication is automatic. The transmission is of the sun and planet type and the control is secured by frictional brake bands which are operated by a single lever for forward changes and by a treadle for reverse.

The length of the wagon over all is 9 feet 8 inches; width over all 5 feet 9 inches; wheel base 6 feet 6 inches; tread 4 feet 8 inches. The inside dimensions are 4 feet 3 inches long, 3 feet 1/4 inch wide and 3 feet 5 inches high, and the wagon is intended to carry 3,000 pounds with ease. The woodwork is of ash, painted red.

Locomobile Touring Car with Canopy Top.

The accompanying illustration shows a four cylinder Locomobile touring car, with King of the Belgians body and canopy top, which was recently delivered to the Cleveland Automobile and Supply Company. The chief point of interest in connection with this car is the luxurious body work. Hitherto American manufacturers have received little encouragement in the



GENERAL DELIVERY WAGON.

line of high grade and luxurious bodies, because those who go in for such cars usually showed a preference for foreign productions. Recently the tide began to turn, however, in this respect, and as a consequence the American automobile industry is now branching out in the line of luxurious work, whereas up till recently it confined itself mostly to popular priced cars.

In the car here shown the canopy top, side curtains and glass insure complete protection against inclemencies of weather to the occupants in touring; at the same time, when the curtains are up, the view of the occupants is unobstructed.

"Ecco" Pocket Cell Tester.

A simple and inexpensive instrument for testing dry cells has been brought out by the Electric Contract Company, 252 Centre street, New York. In principle this tester is but an incandescent lamp. A perforated metal cage, however, takes the place of the usual glass bulb, and instead of a fibre or carbon filament a small platinum wire is employed.

The tip is screwed into a socket which terminates in a metal tube, into the other extreme end of which a brass button is fitted. This button is connected electrically with one end of the wire by means of a piece of bell cord and a piece of brass wire, to which latter the platinum wire is soldered. The knob or button is removed and held up against one of the binding posts while the tube is pressed against the other binding post of the battery. A cell that will show about four amperes on an ammeter will cause the platinum wire to glow a dull red. A current of greater amperage will make the wire glow a brighter color. If the filament does not glow at all, the cell should be removed, as it is unfit for further use for ignition purposes. At night no light is required to test a cell, which is a point in favor of this instrument.



LOCOMOBILE TOURING CAR WITH KING OF THE BELGIANS BODY AND CANOPY TOP.

Colcord Upton's New Planetary Gear.

Colcord Upton has made arrangements for the production of his new transmission gears and has formed a company which will be known as the Upton Gear Company, with offices at 144 West Thirty-ninth street, New York.

The gear illustrated in Fig. 1 is of the planetary type and employs an epicycloidal train. Three sizes of gears will be manufactured. No. 1 is intended for cars weighing up to 1,000 pounds; No. 2 for vehicles weighing 1,600 pounds or less, and No. 3, the largest size, will drive machines weighing not more than 2,500 pounds. The high speed is direct and is obtained by throwing in the cone, which brings the brake bands of the clutch (shown in Fig.

2) to bear on the drum. The slow speed gives a reduction of $2\frac{1}{2}$ to 1, while the reverse gives a reduction in the different sizes of from 4 to 5 to 1. To obtain the reverse a brake band is brought to bear on the large drum; while the small drum must be clamped to drive by means of the low gear. In Fig. 2 the high speed clutch is shown in end elevation. To adjust the clutch bands it is only necessary to relieve the small set screws, and to set the screws which bear against the cone. With this method of securing the screws good results will be obtained. The gear is of the external type and comprises two strap steel bands, which are brought to bear on the outer periphery of the drum. Two drop forged bell cranks are provided to engage the bands. These levers are actuated by a cone of the usual form which slides on the shaft.

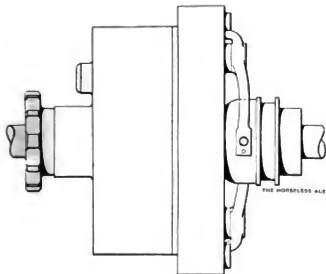


FIG. 1.

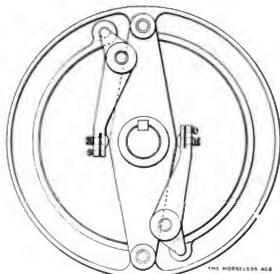


FIG. 2.

COMMUNICATIONS.

Overhauling a Steam Automobile.

Editor HORSELESS AGE:

The writer's recent experience in "overhauling" a steam runabout of the earlier type has been so satisfactory that he believes some of the ideas gained from this experience may prove of value to someone who contemplates the same thing.

It is not assumed that anything that follows will be of any material assistance to the repair man, as it is presented from the standpoint of the amateur; but some reader of THE HORSELESS AGE may own a steam machine needing overhauling, or may be thinking of procuring one with the idea of putting it in shape to use, and like the writer, proposing to do most of the work with his own hands. If the reader has familiarized himself with the use of hand tools, has a little mechanical taste or inclination, either has or can get access to a shop where there are a few machine tools and where an occasional hour of a machinist's time can be obtained for the more difficult work, and will be patient and persevering, he will be surprised to find for how little actual money he can provide himself with a really very serviceable steam machine.

It is quite possible in any of the larger cities to pick up a machine of the vintage of 1900 or 1901, as produced by either of the two large early companies, for less than \$200, perhaps not much over \$100, that is not at all in bad condition, except as to paint and nickel. The great danger, of course, is in getting one with a badly damaged boiler, and here one has to take some chance, as the repairing of a thoroughly scorched boiler is a serious undertaking.

Having gotten the vehicle to the shop, we proceed to "knock it down" by removing engine, boiler and tanks, and body from gear.

Commencing with the gear, the chances are that the front axle, wheels, steering gear and springs are all right, except that some new cones and balls will be needed, and that the steering apparatus may need to have the "slack" taken up. We begin at once to make up a list of small parts that require renewal, and send to the nearest branch of the company that made the machine for them. The local machinist or repair man will suggest that he get out these parts on his lathe, but I advise that they be sent for.

The reaches may either require nothing; they may be slightly sprung, or, the inner rod at the wrist joint may be quite off, in which case a new one can be brazed in. An entire new reach is not a very expensive matter, however.

The rear bearings will probably require

renewal, but it is surprising how good a condition they may present, unless the machine has been woefully abused. The rear wheels—as well as the front—are to be trued up, and all faulty spokes replaced—easy labor when the wheels are off. Mark wheels, springs and all parts right and left, for reassembly.

The differential will be rickety, but unless there are broken teeth it can be drawn up into good mesh by metal washers, or by heating the large gears—supposing it to be a bevel gear differential—and dishing them in a little on an arbor press.

A new sprocket will likely be in order, and we may decide upon a whole new differential. The brake will need a new belt leather shoe. While all this has been going on, a boy has been burning off the body paint, sandpapering well the springs and reaches, and rubbing down the spokes and hubs with emery cloth, while the handle bar, steering head, water glass sockets and other nickel parts are at the nickel platers.

I omitted to say regarding the differential that it seems well to send to Pratt & Whitney for a pair of No. 6 taper pins to substitute for those that have been driven out of the differential hubs, and if you cannot find a No. 6 taper reamer in town, they have them.

Now about the engine, it is probably a Mason, and will need new piston rings, crossheads, pump parts, sprocket and perhaps new links and blocks. The Mason people have them all in stock. I took out the ball bearings from the main shaft, had steel collars shrunk on instead, and brasses fitted into the engine frame where the ball races were, with No. 9 grease cups for lubrication. It makes rather a short bearing— $1\frac{1}{4}$ inches—but if fitted with liners that gradually come out, and then by planing down straps, two years' use can be gotten out of them, and there will be no broken balls, for crank bearings do not break if the shaft bearings are good.

Set up the engine now, packing the stuffing boxes with Garlock rings, and the throttle and goose neck with one-eighth inch asbestos wicking, soaked well with graphite grease, running up the stuffing box nuts only finger tight at first. Unless one is expert, it is better to get some old steam man to set the slide valves and pistons.

Gasket the engine heads with Jenkins "96," setting up the screws with graphite pipe compound, and after they are tight, tighten them some more, then do it with the metal hot. Treat the steam chest cover the same way. For lubrication, order a medium size steam auto lubricator from Lunkenheimer, attach it where it can be easily filled, and use in it about two teaspoonfuls to the quart of Dixon's "635" in good cylinder oil. Keep the stuffing boxes on the lubricator well packed with the Garlock, or it will not feed. Then for slide lubrication order a No. 2 "Marine"

grease cup (same make), put it on the machine in an accessible place, where the handle of the threaded plunger can be reached when running, and connect it up by a tee and some light tubing to deliver its oil just at the top of either slide, using in it the oil and graphite. Every 2 miles or so give it a quarter turn or more, thus delivering two or three drops, and your new cross heads will be tight even on a single slide engine for many moons. Then there is no worry about opening and shutting as in sight feed cups.

Of course, a "Pony Rochester" or some other good oil pump may go on if one wishes to tour, but I would not advise much cross country work with this kind of a rig.

Next look at the boiler. Wash it out well with strong potash solution, then with water containing a little kerosene. Put a flue brush through the fire tubes.

Turning now to the body, the sills will generally be found burned, cracked and shaky. Substitute angle iron or channel stock for engine and boiler sills, or, easier, plate them with three-sixteenths steel strap, $2\frac{1}{2}$ inches wide, bent at right angles at the ends, and bolted to the outside sills and to each other with carriage bolts. Hang the engine and boiler to these reinforced sills and they will stay in place. As to the burner, if it is a gasoline pan burner, scrap it and put on a kerosene burner. My own experience is limited to one make, the Novelty Appliance "Blue Flame," and it is certainly all right. No doubt there are others, but after about six months' use of this burner, I think that I can say that my fire troubles are over. Then, again, when one is running every day, the difference between 12 and 22 cents per gallon for fuel makes quite an item.

One point—for caulking up around the burner, between the burner proper and the case, and to stop all leaks between the case and the lower sheet of boiler, use the "Retort" cement of H. W. Johns-Manville Company. Allow it to air dry a day or two before starting the fire. Still another—attach a sheet metal apron to the burner case on the mixing tube side, with an opening in it corresponding to the mixing tube, the apron to measure about 4x12. This will prevent the fire from licking up from below and getting at the jet. Caulk up about the hole where the mixing tube comes through with the cement, as well as all about the casing to the pilot light, and the fire will never back light. This cement dries hard as iron and almost needs a cold chisel to remove it when changes are necessary.

Also, scrap any copper air or fuel tanks, and replace them with steel tanks. My practice is to use but one, a 5 gallon beneath the footboard, as the less the number of tanks the fewer fittings are required, and hence less the chances for leaks. As the kerosene burns better with air under 80 to 100 pounds, the air lines and fittings must be made up with care, using for in-

stance, electric pipe compound on the threads.

As to accessories, I believe in a hand boiler feed pump for emergencies, although mine is often unused for weeks, and of these the pump of the Locomobile Company is the best and simplest I have seen. Direct acting steam pumps for water or air do not amount to much and never will without a flywheel, and where can a flywheel go?

Discard also the automatic fuel regulator (so called) and regulate the fuel from the seat, if trouble is to be avoided.

Now proceed to reassemble, putting back the springs and all carriage work with new carriage bolts carefully fitted; put a feed water heater into the muffler and lag up well around the boiler hood and on top of the engine with retort cement. It is unnecessary to put on steam first as a leak test, for if the packing that I have advised be used and all fittings made up with reasonable care and skill there will never be steam leaks at first, nor for quite a long time. Find some journeyman carriage painter out of work to come into the shop, buy the lead, color and varnish, and the painting, stripping and varnishing will be a small item.

Meantime put on the newly nicked parts, have the upholstery and tires repaired or renewed where necessary, and you are in possession of a steam automobile that has cost not over \$300 in money, quite a number of Saturday afternoons and evenings of several weeks to be sure, but that is, in many respects, better than the \$500 or \$600 cars that are being sold now. More than that, the experience and training will be of the greatest assistance in running and caring for the vehicle in the future.

W. M. HUTCHINSON, M. D.

Touring in the Catskills

OCEAN GROVE, N. J., July 3.

Editor HORSELESS AGE:

In reply to Edward Mallinckrodt as to the practicability of touring the Catskills, I will say that last fall, during that very rainy spell, when the roads were the worst, I was over pretty nearly every part of the mountains in my steam runabout, and I found that they were very nearly as good for touring as the Berkshires. Of course, the grades are heavier, but the roads are in good condition, and I found nowhere any roads I could not go on, nor any hills I could not take with two in, and I think any of the good machines will do the same. If Mr. Mallinckrodt will write me I will send him a full detailed itinerary of where I went, etc.

N. H. KILMER.

L. L. Whitman and E. J. Hammond, of Pasadena, Cal., started from the City Hall, San Francisco, on July 6, on a transcontinental automobile trip to New York. They carry a letter from Mayor Schmidt, of San Francisco, to Mayor Low, of New York, and expect to make the trip in sixty days. The make of machine used is not stated.

...OUR... FOREIGN EXCHANGES



The "Circuit des Ardennes" Race.

This race was held on June 22 and 23 over a triangular course of 33 miles in a depopulated district, comprising the towns of Bastogne, Longlier, Halay and Martelange. The big cars raced in the morning of the first day, going six times around the course; the small cars raced in the afternoon of the first day, also making six rounds. On Tuesday the voiturettes went twice round the course in the morning, and the motor bicycles twice round in the afternoon, the starting place for each of these classes, however, being from Arlon.

Last year Jarrott won on a Panhard car, in 5h. 53m. 39.3-ss., establishing a record average of about 54½ miles an hour, though this record was beaten by Gabriel in the Paris-Bordeaux race, when he averaged 65½ miles an hour. Twenty-seven big cars started on June 22, the English drivers, including Jarrott (De Dietrich), S. Girling (50 horse power Wolseley), Callan (50 horse power Wolseley), and Lisle (80 horse power Star). Baron Pierre de Crawhez, the well known Belgian automobilist, won on a 70 horse power Panhard, in 5h. 52m. 73-5s., over a minute faster than the winner's time last year. The first round was covered by Baron de Crawhez in 56m. 40s. Girardot, on a C. G. & V. car, was second, 6h. 24m. 29 1-5s.; De Brou (De Dietrich) was third, twelve minutes later.

Only ten cars finished, the proportion of which broke down being very large, which shows that the endeavor to put big engines on light cars has been carried to extremes. Girling, who came in tenth, was the only Englishman to finish within the time limit. Jarrott gave up owing to an accident to his car. Vanderbilt's Mors broke down in the second round. Terry (Mors) and Lisle came to grief at the same turning at Longlier, Lisle's mechanic having his ankle injured. At another corner the assistant on Béconnais' Darracq was thrown out, but was able to proceed, and the car finished fifth. The best French drivers did not compete.

International Acetylene Searchlight Competition.

A competition is being organized by the German Automobile Club, the German Acetylene Association and the Mid-European Motor Wagon Association, for acetylene searchlights and acetylene lamps, which, attached to automobiles, serve the purpose, on the one hand, to make the vehicle visible at a long distance, and, on the other, to illuminate the stretch of road ahead of the vehicle in driving. Of each searchlight entered one sample and of each lamp two samples must be presented to the secretary of the German Automobile

Club, Berlin, Sommerstr. 48, together with a drawing or blue print and three copies of the instructions for use, before February 1, 1904. The entry fee, 10 marks per searchlight and 15 marks per pair of lamps, must accompany the application for entry. The lamps will be tested both in the laboratory and on the road. Prizes of 600 marks and a gold and silver medal are at the disposal of the jury, which are being offered by the three organizations promoting the contest and by a carbide firm.

Automobiles in Mexico.

Three years ago there were in the City of Mexico two or three gasoline automobiles of French construction and two light American steam cars. At that time the Mexican Electric Vehicle Company established a number of stations in the city, which brought electric vehicles into vogue. Numbers of Mexicans who went to the Paris Exposition brought back with them great enthusiasm for the self propelled vehicle, and in some cases even vehicles, and the movement then became firmly established.

There are now in the City of Mexico 125 automobiles, of which between forty and fifty are of the electric type. The machines comprise the following makes: Panhard-Levassor, Darracq (gasoline), Columbia (gasoline and electric), Oldsmobile (gasoline), White, (steam), and the Locomobile (steam). The demand is principally for light machines of the run-about type, and of this class the Oldsmobile seems to be most extensively used at present.

What will probably help the automobile movement in the City of Mexico is that after the completion of the sewerage system there recently many of the streets were laid with a fine asphalt pavement. The road from the heart of the city to San Angel is being rapidly completed, and another long road running in an opposite direction from the city is to be connected with it, so that automobilists will be able to enjoy long spins on good roads.

Roads are now being built to Saltepec, Tlalpam and San Angel. In the city the favorite driveway for automobiles is the Paseo de Reforma, which is famous as one of the very finest driveways on the North American continent.

An automobile club has just been formed in the City of Mexico. While it will confine its labors and pleasures to the Federal District, it is its purpose to promote good roads in all parts of the republic that are in communication with the city. Of the club, President Diaz and the members of his Cabinet are honorary directors, and Señor José Linantour, Minister of Finance, is the honorary president. Señor Pablo Escandon is the active president of the club, Francisco Suñaga is vice president, Javier Algara is treasurer, Charles S. Seeger, secretary, and the other officers and directors are Fernando de Teresa, Ramon

Corona, José de Jesus Phiego, C. Gordon Paterson and Rafael Bernal. There are fifty charter members and the number of proprietary members has been limited to eighty.

New Kilometre Records.

In the speed trials in Plunrix Park, Dublin, on July 4, Gabriel reduced the time for the kilometre with flying start to 26.45 seconds, with his Mors racer. A little later this record was broken by Baron de Forest with a 70 horse power Panhard machine, who made a time of 26.35 seconds, corresponding to over 86 miles per hour. De Forest won both the 100 guinea challenge cup for the fastest car weighing under 1,000 kilograms and the Autocar challenge cup for vehicles of any power and weight.

The governing board of the Swiss Automobile Club has abandoned all races projected for 1903.

Complaint has often been made of the very bad state of the roads in Belgium, but one of the apparent causes for their bad condition has just been removed. It appears that the road masters (cantonniers) were very poorly paid, but had the privilege of running refreshment establishments. They very naturally paid more attention to their refreshment business than to the roads. Now their salary has been improved, the liquor license withdrawn and the Government furnishes a bicycle free to each cantonnier for the ready inspection of the roads.

In England the question has repeatedly come up whether it is illegal to warn automobilists of police traps. At Guildford, a fortnight ago, a local automobilist who was stopped on the Ripley road continued his journey and warned other drivers of the presence of the trap. At the next sitting of the Surrey County Bench at Guildford uniform fines of £3 and costs were imposed on all automobile defendants, with the exception of the one who had rendered the friendly service named. He was fined the maximum penalty of £10, without any allegation of abnormal speed.

Herr Thaddäus Robl, who is described as "the German runner who holds the championship of the world," has made an automobile trip in Australia and has published some of his experiences, which read very much like the stories of travel published by his famous countryman Baron Münchhausen, after the latter's trip through Russia. Among other things he speaks of the temperature: "For eight days we have had here (January) a temperature of 140° to 160° Fahr. in the shade." It occurs to us that with 160° Fahr. in the shade it ought to be warm enough in the sun to run a steam automobile without a fire.

Motor Cycle Endurance Contest.

The Metropole Cycling Club, of New York City, and the New York Motor Cycle Club held their second annual endurance run, from New York city to Worcester, Mass., and back, on Friday, Saturday and Sunday last, July 3, 4 and 5. The course was divided into three stages, as follows: July 3, New York to Springfield, 144 miles; July 4, Springfield to Worcester and back to Hartford, 120 miles, and July 5, Hartford to New York, 120 miles. The total length of the run was, therefore, 394 miles. The start and finish occurred in front of the Metropole Cycling Club, 1904 Broadway, New York.

There were thirty-two starters in the contest on the first day, and sixteen of these, or just one-half, reached the finish in due time. It is worthy of note that most of those who failed to complete dropped out during the first day. Nineteen of the contestants got to Springfield, eighteen to Hartford and sixteen to New York.

The proportion of machines completing to those starting was more favorable this year than last, as last year only thirteen out of thirty-three starters completed. The rules and conditions were essentially different, however, and on the whole more severe this year than last, as no repairs were allowed at controls. Last year the run was from Boston to New York and occupied only two days.

The officials of the organizing clubs state that fourteen out of the sixteen who finished have earned the maximum of 1,000 points. The entries were divided into two classes, one comprising machines under 2½ horse power and the other machines of 2½ and more horse power. The marking was based on a time schedule which required an average speed of 15 miles per hour for the machines of higher power and an average of 10 miles per hour for the others. A gold medal was offered to the rider who came within the limit and whose time deviated the least from the schedule.

Among the machines that completed the run in good shape were two Wagners, ridden by B. B. Bird and R. R. Boorman; one Merkel, ridden by J. W. White; one Indian, ridden by G. M. Hender, and two Columbias, ridden by N. P. Bernard and W. J. Ziegler. The others of the sixteen that finished were Joseph Downey, of Roslindale, Mass.; G. B. Piefer, Brooklyn, N. Y.; C. N. Emerson, Lowell, Mass.; L. Holland, Worcester, Mass.; J. M. O'Malley, Hartford, Conn.; J. H. Bartlett, New Britain, Conn.; F. B. Donina, Providence, R. I.; A. A. Hoyt, Whitman, Mass.; F. O. Hanfeld, New York; F. A. Bowen, Utica, N. Y. George M. Hender, Joe Downey or Lincoln Holland will probably be awarded the gold medal for coming nearest to the schedule.

The official results are not yet available at the time of writing, but we expect to print them in our next issue.

Club Notes.



ROCKFORD A. C.

Rockford, Ill., is to have an automobile club.

DAYTON A. C.

The Dayton Automobile Club, of Dayton, Ohio, has inaugurated a series of regular weekly runs to neighboring cities.

A. C. OF N. J.

The Automobile Club of New Jersey has appropriated \$200 to be used in placing road signs between Highland Park and Perth Amboy.

A. C. A.

The Automobile Club of America has decided to appeal directly to Mayor Low, of New York City, concerning the bad condition of Jerome avenue, which they some time ago denounced in a set of resolutions presented to Borough President Haffen, of the Bronx.

Crossed the Continent on a Motor Cycle.

George A. Wyman on the afternoon of July 6 completed a trip from San Francisco to New York on a motor cycle, or rather with a motor cycle, for, according to his own statement, he was not always on the machine, but frequently had to push it. The time elapsed between starting from San Francisco and arriving at New York is fifty days. The start was made on May 16; Omaha was reached on June 11, Chicago on June 18, Buffalo June 30, Albany July 4, and New York on July 6. During the last part of the trip various parts of the machine developed signs of weakness. Considerable repairs were made in Buffalo, and the trip to Albany was made without much difficulty, but 30 miles out of the latter city the motor went wrong again. Wyman, now so near his destination, pedaled all night to get to New York. A great proportion of the distance the railroad tracks were followed. Wyman claims to be the first man to have crossed the Continent on a motor propelled machine.

A serious accident, resulting from the practice of chauffeurs using their employers' machines without permission, landed Geo. W. Folsom, Chester H. Parson and William A. Whitman behind the bars in Worcester, Mass., last week. The prisoners were charged with assault by Richard E. Farrell and Miss Catherine Sullivan, who allege that defendants' machine collided with a buggy in which they were riding, seriously injuring Miss Sullivan. The automobile is said to be owned by J. Montgomery Sears, of Boston. One thousand dollars bail was required from each of the trio.



An automobile club has been organized in Aurora, Ill.

A meeting of officials, agents and salesmen of the Pope Motor Car Company was held in Toledo, Ohio, June 30.

The H. H. Franklin Manufacturing Company, of Syracuse, N. Y., has let the contract for an addition to its plant, to cost \$40,000.

The Electric Vehicle Company is now giving demonstrations in New York city with one of its 5 ton trucks of the four wheel drive type.

The Adams Express Company is using thirteen electric express wagons in Buffalo, N. Y., and an additional five have been sent to Rochester, N. Y.

The board of directors of the A. C. of Detroit has resigned. A special meeting was held on June 29 for the appointment of their successors.

Some photographs of wrecked cars in the Paris-Madrid race show that the manufacturers drilled the piston walls all full of holes to reduce weight.

The Summer Festival Association, of Des Moines, Ia., organized an automobile parade for June 24, in which nearly every machine in the city participated.

The Reading Automobile Company, of Reading, Pa., state that they will prosecute infringers of their United States patent No. 698,212, covering a ratchet brake.

The Auto Tours and Livery Company has just been organized in Buffalo, and will have its headquarters with the E. R. Thomas Motor Company, of that city.

Banker Brothers, Philadelphia, for the week ending June 27, report sales to Walter A. Bailey, Valentine L. Franz, Charles Longstreth and F. P. Wilcox, all of that city.

One of the members of the National Association of Automobile Manufacturers are urging that the fall endurance run planned by that body be made to Cleveland instead of to Pittsburgh.

The Nenstadt-Perry Company, of St. Louis, are now building a machine with separate springs for the machinery frame and the body, which prevents the vibration of the motor being felt by the occupants.

John C. Fish, of Shelby, Ohio, has been appointed receiver for the Shelby Motor Car Company. The company's liabilities are placed at \$60,000, with assets of \$50,000. The petition for receivership was filed by J. J. Jackson, of Cleveland.

The Case School of Applied Science, of Cleveland, Ohio, will soon institute courses in automobile engineering. The three established types of power will be covered, and demonstrating equipments have been donated by several prominent manufacturers.

Mr. and Mrs. R. Calvert Taylor, of Norfolk, Va., suffered an odd mishap last week, their machine being caused to upset by an attack from a large pack of dogs, said to have been half frenzied by the warm weather.

Lipscomb & Garrett, of Dallas, Tex., lost a carload of automobiles in the recent flood at East St. Louis. When finally found, the car was bottom up on the roof of a building, with the automobiles so badly damaged that the consignees refused to accept them.

C. S. Bundesmann, of 1826 Forbes street, Pittsburg, Pa., has invented a number plate which ought to prove useful to automobile tourists traveling through different States. This plate is of the usual length and width and about one-half inch in thickness, and will give any number up to 9999, as desired.

A patent has just been granted to Oscar Hedstrom, the designer of the Indian motorcycle, for a carburetor with automatic regulation of the air supply. It is claimed that this carburetor, to which much of the speed of the Indian motor is attributed, antedates the well known compensating carburetor invented by Krelis, in Europe.

Charles B. King, Detroit, manufactures a device which he terms a concentrator, consisting of an electric condenser for the secondary circuit of a jump spark outfit. The device, which is made for engines of one to four cylinders, also comprises an auxiliary gap and is so arranged that it can be attached to the dashboard. It is claimed that the combined condenser and auxiliary gap obviate all spark troubles.

The Gordon Bennett cars were weighed at the market square, Naas, County Kildare, at 11 a. m. on Wednesday, July 1, when they were examined with a view to ascertain if they conformed to No. 8 of the Gordon Bennett rules, which requires that cars must be constructed in respect of all their parts in the country which they represent. The cars were also examined to see that they conformed to the rule as to the direction of the exhaust. Immediately thereafter they were stamped and marked for identification. The numbers were then painted on back and front, not less than 12 inches high.

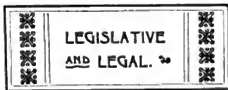
New Corporations.

The Motor Vehicle Company, of Louisville, Ky.—Capital, \$10,000.

The Automobile and Repair Company, Denver, Col.—James H. Nichols, Jr., Orrin T. Higgins, and George P. Hering, incorporators. Capital, \$10,000.

The Pioneer Automobile and Campus Motor Company has just been incorporated in New York with a capital of \$20,000. The directors are H. V. Wyckoff, S. A. Hauds and Cecar Camp.

The Brown Motor Vehicle Company has been organized in New York to manufacture automobiles. The incorporators are C. H. S. Brown, F. F. Goodman and F. D. Homan; \$2,000 is the capital.



The city council of Joliet, Ill., has adopted an 8 mile ordinance.

Waukesha, Wis., proposes an automobile ordinance with a 4 mile an hour speed limit.

Over 800 registrations are on file at Hartford, Conn., as a result of the new State automobile law.

As finally passed, the maximum speed permitted by the new Kansas automobile law is 20 miles an hour.

Automobile owners of Toledo, Ohio, are preparing to make formal protest against the proposed ordinance taxing automobiles.

Five arrests were recently made in Newton, Mass., as the result of a police trap set on the Newton boulevard.

The authorities of Erie, Pa., are now after the unlicensed automobilist. The registration fee is \$2, and the yearly tax \$3. Several arrests have been made.

Memphis, Tenn., is about to take action on a newly formulated automobile ordinance. The speed limits are indefinitely stated as from 4 to 12 miles an hour.

Mayor Stoy, of Atlantic City, N. J., has advised that automobiles be exempted from the provisions incorporated in a proposed ordinance concerning the storage of liquid hydrocarbons.

Orrel A. Parker, a New York city attorney, who was arrested for speeding his automobile on Fifth avenue, has brought an action for illegal arrest against the bicycle policeman who made the arrest.

A judgment for default for \$570 rent due Fred S. Todd has been returned against the Foster Automobile Manufacturing Company, of Rochester, N. Y. Other creditors are suing for some \$1,500.

Carlton R. Mabley, of the firm of Smith & Mabley, of New York, was arrested in Central Park last week on the charge of operating an automobile without a distinguishing number. He will contest the case on the ground that dealers need not carry numbers.

A deputation of automobilists is working with the city council of Detroit, Mich., in an effort to frame a local ordinance that will not work harm to the automobile interests of that city. It is proposed that the local speed limit be put at 15 miles.

A motion for a new trial has been made in the case of Laura T. Lombard vs. Flavell A. Chaplin, auto owner, at Portland, Me. It is alleged that plaintiff's horse was frightened by the latter's automobile. The result of the first trial was an award of substantial damages.

The Chicago authorities announce that they will commence enforcing the new

numbering ordinance July 8. The law requires white Arabic numerals, 5 inches high and printed upon a black background. Metal numerals are held not to comply with these provisions.

Two arrests have marked the opening of a campaign against unnumbered automobiles and motor cycles in St. Paul, Minn. The making of arrests is effected by placing a wire seal on the wheels of automobiles found standing without license numbers. A heavy fine is the penalty for breaking such seals.

Automobile owners not residents of New Jersey seeking to obtain licenses in that State must not forget to accompany their application by affidavits of their ability to run a machine issued by a county clerk of notary public standing. More than a hundred New York automobilists are said to have overlooked this requirement inside of a week.

Doubling Engine Power.

At a State fair last fall I ran across a crack-a-jack gasoline engine salesman. The engine in question was one having a piston at each end of the cylinder, which, of course, had no cylinder head. The charge was compressed between the two pistons, was then ignited, and the resulting explosion forced the pistons out in opposite directions. By reference to the manufacturer's catalogue I have since found that about the only advantage claimed to be due to this method of construction is the balancing of the engine and the reduction of jars and shocks. The salesman in question, however, gave the following vivid explanation to a number of open eyed farmers who were inspecting his engine:

"You see, gentlemen, we have a cylinder open at both ends, with a piston in each end. Now in the ordinary engines, such as you will see elsewhere on the grounds, there is a cylinder head and only one piston. When the explosion takes place half the force of it is wasted against the stationary cylinder head, while in our engine the second piston receives the force that is usually exerted against the cylinder head. Thus you will see that we do not waste a particle of the explosion, and we get double the power that other people get from their single piston engines!"

This argument appealed very strongly to most of the farmers, many of whom winked their eyes at each other and sagely remarked, "Pretty slick, that, isn't it?"

The salesman, however, had at least one unbeliever in the person of a professor of mechanical engineering. The "professor" remonstrated, but he could no more move the salesman from his statements than he could have moved the Rock of Gibraltar. "Why," exclaimed the salesman, "do you suppose that my firm would hire me if I didn't know my business? What do you suppose they pay me for, anyway?"—*American Machinist.*

Electric Charging Stations in Boston and Vicinity.

The Edison Electric Illuminating Company of Boston, in order to promote a larger use of electric vehicles, is now installing upon its lines in Greater Boston electric charging stations for automobile batteries. These stations will be located in premises accessible at any time during twenty-four hours every day in the year. The rate to be charged is 10 cents per kilowatt, with a minimum charge of 30 cents.

The following is a list of charging stations on the lines of the Edison Company now ready to supply customers:

East Boston—62 and 64 Central square.
Milton—L. Crossman & Sons, livery stable.

Dedham—Toomey's Stables, Washington street, near Memorial Hall square.

South Framingham—D. J. Cooney's "Palace Stables," Waverly street, near B. & A. depot.

Natick—Edward L. Lackey, livery stables, off Main street, near depot.

Winchester—Kelley & Hawes, stables, Winchester square.

Grove Hall—Wales Boulevard Stables, 460 Blue Hill avenue.

Somerville—Electric Light Company Station, Willow avenue.

Watertown—Newton and Watertown Electric Light Station.

Woburn—Woburn Light, Heat and Power Company's Station.

The following are power stations where electric vehicles may be charged during the twenty-four hours:

Brockton—Edison Electric Illuminating Company, 33 Lincoln street.

Brookline—Brookline Gas and Electric Works, Cambridge street.

Cambridge—Cambridge Electric Company, Western avenue and Blackstone street.

Gloucester—Gloucester Electric Company, Vincent street.

Lawrence—Lawrence Gas Company, Essex street.

Lynn—Lynn Gas and Electric Company, West Lynn.

Lowell—New England Motor Company, 82 Fletcher street.

Malden—Malden Electric Company.

Medfield—Electric Light and Power Company, Medfield Junction.

Salem—Salem Electric Light Company, 19 Peabody street.

Stoughton—Stoughton Electric Light Company, off Rose street, near railroad station.

Weymouth—Weymouth Electric Light Company, East Weymouth, near railroad station.

The following are places, other than power stations, where electric vehicles may be charged and hours when same are accessible:

Arlington—Wetherbee Brothers, 480 Massachusetts avenue, at railroad crossing,

open daily from 7 a. m. to 9 p. m.; Saturdays to 10 p. m. and all day Sunday.

Boston—Electric Vehicle Company, 74 Stanhope street, open twenty-four hours per day.

Automobile Headquarters, 66 Stanhope street, open twenty-four hours per day.
American Bicycle Company, 233 Columbus avenue, open only week days from 8 to 6 o'clock.

Park Square Station, No. 1, open twenty-four hours per day.

Brockton—W. H. Marble, 52 High street, open 6 a. m. to 10 p. m. on week days and all day Sundays.

Fitchburg—G. M. Park & Co., 453 Main street.

Lawrence—Fred Ellis, 105 Cross street, open 6 a. m. to 10 p. m.; all day Sunday.

Lowell—George W. Morrison, 195 to 199 Moody street, open from 7 a. m. to 10 p. m.; all day Sunday.

Lynn—H. A. Littlefield, 747 Washington street, open week days 7 a. m. to 12 and 1 to 6 p. m.

By August 1 centrally located Edison charging stations will also be ready for the accommodation of customers in Arlington, Canton, Chelsea, Chestnut Hill, Forest Hills, Needham, Newtonville and Stoneham.

Trade Literature Received.

Ford Motor Company, 688-692 Mack avenue, Detroit, Mich.—Catalogue of Ford gasoline car.

Jackson Cushion Spring Company, of Jackson, Mich.—Catalogue of cushion springs and wires.

Ohio Mechanics Institute, Cincinnati, Ohio.—Annual Catalogue 1902-1903; also "Some Words and Pictures."

Joseph Dixon Crucible Company, of Jersey City, N. J.—Pamphlet relating to Dixon's pipe joint compound.

Studebaker Brothers Manufacturing Company, of South Bend, Ind.—Catalogue of Studebaker electric vehicles.

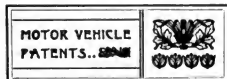
Remington Motor Vehicle Company, Utica, N. Y.—Pamphlet describing gasoline car of 10 horse power motor.

Edison Electric Illuminating Company, of 3 Head place, Boston.—"Advance Information" on electric vehicle charging stations.

White Sewing Machine Company, 300 Rose Building, Cleveland, Ohio.—"An Interesting Trip from London, England, to Sheffield in a White Touring Car."

The International Fire Engine Company, 149 Broadway, New York city.—Circular of the La France automobile combination chemical fire engine and hose wagon.

The Chief British Depot, 94 Victoria street, Westminster, London, S. W.—Catalogue of steam cars (the Chaboc, French Gardner Serpollet and the new English Gardner Serpollet). Also catalogue of the Delahaye cars.



United States Patents.

731.134. Electrical Igniter for Explosive Engines.—C. E. Sargent, of Chicago, Ill. June 16, 1903. Filed November 3, 1900.

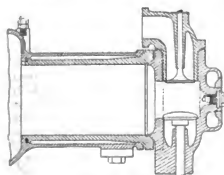
The object of the invention is to produce an igniter which shall be more reliable and effective in operation and easier in its manipulation as to necessary repairs and care of working parts. The device is intended for use in connection with a primary ignition system.

731.236. Gas Engine.—James M. Smelser, of Pendleton, Ind. June 16, 1903. Filed March 10, 1902.

The invention relates to improvements in two cycle gas or gasoline engines.

731.308. Method of Producing Electrodes for Electric Accumulators.—E. W. Jungner, of Stockholm, Sweden. June 16, 1903. Filed August 5, 1901.

This invention relates to a method for increasing by electrolytical means the sur-



No. 731.265.

face of such metals whose oxygen combinations are chemically insoluble in alkaline solutions.

The process consists in a metallic body that is used as anode in an alkaline solution, to which is added a salt whose acid radical forms with the metal a soluble salt for the purpose of obtaining by a kind of corrosion a considerable increase of the surface of said metallic body, by which it is rendered suitable to serve as a carrier for active masses that possess little or no conductivity. Such masses are thus brought into very close (molecular) contact with the conductor, and the electrode made in this manner has a very great activity for receiving and delivering electrical energy.

731.225. Angle Shaft Coupling.—S. W. Robinson, of Columbus, Ohio. June 16, 1903. Filed January 31, 1903.

731.370. Vapor Burner.—C. F. Jenkins, of Washington, D. C. June 16, 1903. Filed May 28, 1900.

This burner, in which kerosene is generally employed as a fuel, has been described in the columns of THE HORSELESS AGE.

731.368. Speed Indicator.—M. R. Hutchison, of Norwood, N. J. June 16, 1903. Filed September 24, 1902.

The object of the invention is to provide a device which will automatically give an audible and visible indication of the speed of the vehicle as well as of a predetermined critical speed. A further object is to provide an apparatus capable of being readily adjusted to give the required indication at different speeds, and to show, at all times, the speed at which it is set to indicate.

The device comprises centrifrically operated bell hammers, a conical bell (which can be moved with respect to the hammers so as to alter their stroke) and a dial.

731.422. Zinc Cup for Primary Batteries.—Vincent G. Apple, Dayton, Ohio. June 23, 1903. Filed March 23, 1903.

731.447. Process of Constructing Storage Battery Plates.—George H. Gale, Detroit, Mich. June 23, 1903. Filed May 16, 1902.

731.470. Electrically Controlled Speed Changing Apparatus.—Leon J. Le Pontois, New York, N. Y. June 23, 1903. Filed July 25, 1902.

731.472. Electrically Controlled Speed Changing Mechanism.—Leon J. Le Pontois, New York, N. Y. June 23, 1903. Filed September 19, 1902.

731.657. Steam Boiler.—Robert W. Barton, Chicago, Ill. June 23, 1903. Filed March 2, 1903.

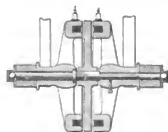
731.265. Cylinder for Oil, Spirit or Gas Engines.—Herbert Austin, of Erdington, England. June 16, 1903. Filed April 23, 1902.

The invention relates to removable liners for gas engine cylinders. The head, liner and jacket are separate castings and all the bevel joints are supposed to be ground. The joint that prevents the leakage of water into the crank case is provided with packing.

731.471. Electromagnetic Friction Clutch.—L. J. Le Pontois, of France, residing at New York, N. Y. June 23, 1903.

The invention relates to an improvement in electromagnetic friction clutches.

A friction disk is mounted on the squared portion of the shaft between two



No. 731.471.

coils which may be energized from any source. These coils are built into fields, the hub portions of which may be provided with suitable means for driving other mechanism.

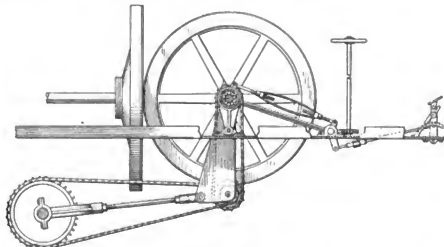
732.016. Explosive Engine Governor.—Ernest Uhlin, McDonald, Pa. June 23, 1903. Filed August 19, 1901.

732.025. Steering Gear for Vehicles.—James L. McDowell, St. Louis, Mo. June 23, 1903. Filed December 11, 1902.

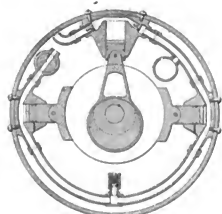
731.507. Explosion Engine.—Karl Schäferkötter, Prüm, Germany. June 23, 1903. Filed June 28, 1902.

730.930. Transmission Gear for Automobiles.—J. W. Lambert, of Anderson, Ind.

The device is of the friction disk variety. One of the objects of the invention is to provide means for preventing the drive chain to the rear axle from slackening during the movement of said drive member toward and from the driving member and whenever vibrations are set up. On an extension of the motor's crank shaft a friction disk is mounted, which engages with the movable disk on the transverse shaft. The latter revolves in ball bearings, which are placed in vertical standards that are pivoted at the bottom. These standards are provided with links (with turnbuckle adjustment). By means of a foot pedal these links are actuated and the standards are swung in the opposite direction in which the foot pedal moves. A hand wheel is used to shift the movable pulley, which is accomplished by means of a pinion that engages with a rack. The latter shifts an arm, which in turn shifts the pulley and varies the speed.



No. 730.930.



No. 731,483.

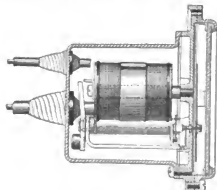
731,483. Third Controlled Friction Clutch Device.—Taylor Matson, of Philadelphia, Pa. June 23, 1903.

An eccentric is mounted on the driving shaft to operate a pump plunger which forces the liquid into the bent tubes. As soon as the cock (shown in the left hand upper corner) is closed the pump forces the opposed plungers inward, and the shoes are brought to bear. A safety valve is provided to relieve the tubes, etc., of excessive strain.

731,484. Charge Indicator for Secondary Batteries.—H. P. Maxim, of Pittsburgh, Pa. June 23, 1903. Filed August 4, 1902.

The invention relates to devices for indicating the condition of secondary batteries as regards their degree of charge, and its object is to provide a simple and efficient means for indicating the battery charge at all times, irrespective of the size of the battery and its rate of discharge. An ordinary voltmeter indicates the amount of available charge only when the battery is discharged at a normal rate. In order to insure an accurate indication of the available charge at all times a voltage indicating instrument has been devised which is provided with means of compensation for such voltage variations as are incident to variations in the discharge rate.

The illustration is a view, partially in side elevation and partially in section, of the battery charge indicator. To the metal plate (behind the glass plate) most of the parts of the instrument are secured. A relatively high resistance coil has a pole piece at its rear end, and is nearly surrounded by a low resistance coil of strap

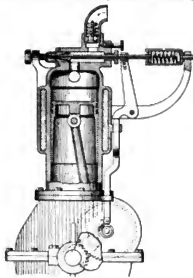


No. 731,484.

metal. An armature is supported by a thin metal strip, which is riveted between the armature and a longitudinally projecting arm. The latter is connected to a short shaft by means of a cord which will turn the shaft and with it the pointer against the action of the coiled spring whenever the arm is moved downward by reason of the inward movement of the upper end of the armature.

731,781. Igniter for Explosive Engines.—T. B. Jeffery, of Kenosha, Wis. June 23, 1903. Filed March 10, 1902.

The purpose of the invention is to provide a novel means of causing the ignition of an explosive gaseous mixture, and specifically to provide an ignition means to cause the said ignition by catalytic action. Provision is made for moving the catalytic agent in the excitant gas to increase the effect of the gas upon it. Means are provided for exposing the most excited portion to the explosion gas at the proper time, and for excluding the catalytic agent when it should be inoperative. Means for



No. 731,781.

preliminary heating of the catalytic agent are also provided.

A sleeve of platinum wire gauze of fine mesh is secured to a plunger shaped carrier, which is provided with ducts by which the gas is directed against the catalytic agent. A cam and suitable mechanism are employed to move the carrier.

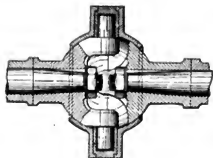
731,677. Rubber Tire.—Christian Grotz, Akron, Ohio. June 23, 1903. Filed April 30, 1903.

731,753. Brake for Motor Road Vehicles.—Ferdinand Charron and Léonce Girardot, Paris, France. June 23, 1903. Filed March 22, 1902.

731,755. Vehicle Running Gear.—George H. Condict, New York, N. Y. June 23, 1903. Filed January 19, 1903.

731,833. Lubricator.—Edwin Allen, Mount Vernon, N. Y., and George W. Carver, Brookline, Mass. June 23, 1903. Filed May 24, 1902.

731,956. Gas Engine.—Charles Rosler, Buffalo, N. Y. June 23, 1903. Filed February 27, 1902.



No. 731,495.

731,495. Universal Joint.—Alfred Poizat, of Paris, France. June 23, 1903. Filed February 5, 1903.

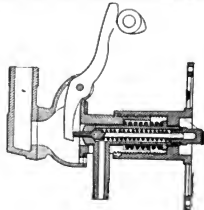
The joint is chiefly constituted by the combination of two exactly similar heads, with external semispherical surfaces and provided with diametrically opposite trunnions. The axes of each set of two trunnions are arranged in the same plane normally to each other. These parts are articulated in bearings which support the trunnions, and the whole is connected by means of two semispherical cases or covers. The latter enclose the bearings and form a tightly closed chamber in combination with the two heads.

731,993. Automobile.—Charles A. Bush, Corry, Pa., assignor of one-half to John J. Loomis, Northeast, Pa. June 23, 1903. Filed October 23, 1901.

731,995. Internal Combustion Engine.—Arthur T. Collier, St. Albans, England. June 23, 1903. Filed February 16, 1903.

731,547. Carburetor for Explosion Motors.—J. Corne, P. Duffau and P. Barathie, of Villeneuve-sur-Lot, France. June 23, 1903. Filed March 3, 1903.

In this carburetor the carbureting operation is rendered uniform by regulating the quantity of spirit introduced while the motor is working, and is intended to provide means for insuring such regulation. The carburetor comprises a mixing chamber, into which a cam actuated lever extends, a valve that controls the feed and means for adjusting the flow of fuel. To reduce the quantity of oil delivered to the mixing chamber within a certain period the hand wheel is screwed back. The large coil spring will then raise the chamber that surrounds the valve, so that the latter opens later and closes sooner than before.



No. 731,547.

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Devoted to
Motor
Interests

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Our Gordon Bennett Race Report.

In the present issue we print a complete, illustrated report of the Gordon Bennett Cup race—the first illustrated report to be printed in the automobile press of this country. THE HORSELESS AGE had three special representatives on the ground, which enables us to deal with the important event most thoroughly. Although the main facts regarding the race—the winners, the times, the accidents—are already known in this country through the cable reports of the newspapers, our special articles will be found to contain many bits of interesting information, particularly things which escape the attention of the ordinary newspaper reporter and are only noted by technically competent observers. The skidding tendency of the Mors car, for instance, noted by one of our representatives furnishes an explanation why this car made a comparatively poorer showing on the Irish course, with its many turns, than on the straight roads of the Paris-Bordeaux race. The observations on the heating of the cooling water in the different cars, the comparative steadiness of running, etc., are equally instructive.

Why Not an International Endurance Competition?

International road racing will undoubtedly be entirely suppressed within the next few years, greatly to the satisfaction of every true friend of the automobile industry. International road competitions deserve to be continued, however, provided they can be conducted in such a way as not to unduly interfere with normal traffic on the highway. An international competition has the advantage that it appeals to the patriotic spirit of the general public, and for this reason is accorded liberal treatment in the public press. The interest in automobiles aroused by such friendly international rivalry and the resulting publicity are certain to be beneficial to the automobile movement in general.

The road race is gradually being superseded by the more practical and entirely harmless endurance contest. The British Automobile Club is now preparing for its fourth annual event of this kind; America will this fall see its third annual endurance run, and France and Germany have also recently recognized the practical character of this kind of competition. A French publication has announced its intention of organizing an endurance contest from Paris to Rome for the coming spring, in which prizes to the value of 20,000 francs will be awarded.

Endurance contests therefore appear to have become the standard form of automobile competition, now being successfully introduced by all the great automobile manufacturing countries. Why, then, cannot international competitions be held on an endurance basis? Sportsmen no doubt will say that an endurance contest is much too tame to arouse the interest of the public, and they may be right with respect to a certain portion of the public. It is claimed, for instance, that a great deal of the popular interest in the late international race was due to the casualties in the Paris-Madrid race shortly preceding it. Those who crave the excitement of daredevil feats (performed by others) would find nothing particularly interesting in an endurance competition. Yet the competitions would possess the fascination of international rivalry and would therefore be of such public interest that the daily press could not afford to ignore them.

From the standpoint of practical results to be achieved, there is really no comparison between a road race and an endurance competition at legal speeds. Also a greater number of nations would contest in such events; the number of manufacturers in each country willing to enter in them would be far greater, and it would not be necessary to make up the teams with cars of the same make. Within a year or two

each of the great nations will undoubtedly have an endurance competition forming the chief event of the season, and the teams for the international competition could be selected from the winners in the national events.

With an endurance competition no expenses would be incurred by the organizers for improving the roads, nor for policing them, and the competitors would avoid many of the burdensome expenses now occasioned by building monster machines, which after the completion of the race are all but worthless. In short, with very much less expenditure magnificent trials and demonstrations could be arranged, which would prove extremely interesting to the public and highly instructive to the manufacturers.

The Mammoth Cave Tour.

When members of the Chicago Automobile Club decided to make a club tour to the Mammoth Cave in Kentucky and back they evidently formed a project fraught with greater difficulties than they thought. The idea, broached during the winter months, was received with enthusiasm by the club, a considerable number of members agreeing to participate. The difficulties to be encountered, however, seem to have been foreseen by some of the would be tourists, for quite a number dropped out at the last moment, and instead of twenty-five, as expected, only twelve cars started.

The "dropping out" continued after the start, and by the time Mammoth Cave was reached only two cars remained in the run. The two chief causes of trouble are reported to have been "bad roads and bad tires." As the rule was observed that whenever repairs were necessary on any one of the cars all the others stopped until it was again ready to proceed, it is not difficult to see why the schedule could not be maintained. Another cause of delay and failure is undoubtedly traceable to the fact that private owners have not the same incentive to keep in the run to the finish as manufacturers have. Although club tours of this kind would greatly benefit the industry and prove an educator to the participants, it is hardly likely that they will ever become popular, at least not if the rule that all stop whenever one of the machines goes wrong is to be retained. The Mammoth Cave run was also handicapped by the fact that the event occurred in the midst of the hot season. The prospect of having to interchange or repair a 4 inch pneumatic on a shadowless prairie

road, with the thermometer above 90, is not particularly inviting even to an enthusiast.

Condensers in the Secondary Circuit.

The latest move in the effort to perfect the jump spark ignition system is to place a condenser in the secondary or spark circuit. Condensers have long been used in the primary circuit, with a view of eliminating the spark at the contact breaker and also of increasing the voltage attained in the secondary circuit, thereby increasing the certainty of ignition. It is only recently, however, that the idea of placing a condenser in the secondary circuit has been put into practice. Yet the idea is not altogether new. A number of years ago a patent was taken out in this country for a spark plug developed in the form of a condenser.

The object of the condenser in the secondary circuit is to increase the volume or the heat of the spark. It is well known that the auxiliary spark gap has a tendency to reduce the volume of the spark, hence the use of a condenser in the secondary circuit is particularly indicated where the auxiliary spark gap device is fitted.

As compared with a condenser for the primary circuit, the secondary condenser, owing to the very much higher voltage in the secondary circuit, can be of relatively little capacity, but it must be exceedingly well insulated to stand the high voltage to which it is subjected. It must therefore be constructed on entirely different lines. While the primary condenser is insulated with paraffined paper, glass or porcelain insulation must be used for a secondary condenser.

Lemoine versus Elliott Steering Pivots.

In connection with our recent editorial on the above subject the statement that abroad the Elliott pivot has entirely been given up has been questioned, and it is asserted that if there is any tendency one way or the other abroad at present it is rather toward the Elliott type of pivot. The following list has been furnished us of foreign manufacturers who use the Elliott type of pivot in some of their latest models, mostly light cars: Panhard, Clement, Richard, Darracq, Milne, Wolseley, Napier and Krupp.

It is admitted that the facilities of lubrication and of adjustment for wear are better in the Lemoine pivot, but, on the other hand, the Elliott pivot possesses greater

strength for a certain amount of metal. The pin of an Elliott pivot can be made much smaller in diameter, and hence less friction is to be overcome in turning the knuckles around their pivots. Finally, adjustment for wear is not altogether impossible with the Elliott pivot. The pins may be made with a slight taper, as the arms of the forked axle end will give a little and may be sprung together by means of the bolt, and, in case of considerable wear, washers may be placed between the knuckle head and the forked axle end.

There is one further reason, we are assured, why American manufacturers, particularly, will be inclined to stick to the Elliott pivot—because it is about the only part of an automobile which has been standardized to any extent.

Working of the Bailey Law.

The Bailey law has now been in force for nearly two months, but so far none of the pessimistic predictions of certain calamity howlers have come true. There have of course been a number of arrests under the law, and both fines and the suspension of license penalty have been imposed, but as yet no case has come to our notice where any very serious penalty has been inflicted. In one case the license of a private owner was suspended for fourteen days, which led to some newspaper comment, but it hardly inconvenienced the party concerned to any extent.

Altogether it appears that the number of arrests has been less numerous since the Bailey law went into effect than before, which is particularly satisfactory when the rapid increase in the number of machines is taken into account. Proposals to contest the law or certain of its provisions are announced frequently, but little progress seems to be made in this respect. On the whole the law seems to be quite generally obeyed by automobilists, and if this condition continues till next winter there is little doubt that the objectionable speed limit in the vicinity of post offices, school houses and churches and other obnoxious features will then be removed.

Calendar of Automobile Dates and Events.

- July 1-15—Irish Farnight.
- July 11—Pittsburg Speed Trials.
- July 12-19—Oxford Automobile Week.
- July 24—Quarterly 100 Miles Trial of A. C. G. B. I.
- July 26—Automobile Races, Empire City Track, Yonkers, N. Y.
- August 10-22—Tourist Motor Bicycle Reliability Trials.

THE GORDON BENNETT CUP RACE.

Weighing in of the Cars—Preliminaries on the Morning of Race.

By HARRY PARSONS.

With weather of the most perfect kind the weighing in was carried out in good order in the market place at Naas, about 22 miles from Dublin, from which latter place a run out in an M. M. C. car afforded a taste of what was to come in the way of crowds of cars, and the opportunity of seeing several of the racing cars on the road. Ireland was fully alive to the importance of the next few days, and everyone seemed to enter into the spirit of the event most thoroughly.

It is not the object of this article to detail fully the picturesqueness of the country but it may be said the surroundings of the great race afforded much pleasure to those who could appreciate them. The district chosen for the carrying out of the events was undoubtedly the most suitable one available, but the free use of the roads by all sorts of animals, and the sharp bends and little bridges, with steep crowns, gave cause for great care in driving, and all had to be specially looked to to prevent accidents on the day of the race and over the particular roads used for the contest. These arrangements, however, will be detailed later on.

The actual weighing in was most interesting and very carefully carried out. In

the absence of a weigh bridge of the usual description two lever weighing machines were placed at such a distance apart that the tables, carrying each a long piece of channel iron, into which the wheels of the cars were run, took a position about correct to bring them under the centre lines of the wheels of the car. Thus the whole of the weight was divided between the two machines, and the readings being added the total was found, after allowing for the dead weight of the channels.

In some cases quite a lot of details were removed from the car to bring it inside the limit, but it was compulsory to have every part necessary to run the car, such as the starting handle, which in some cases must have weighed 40 or 50 pounds, having a ratchet arrangement at the business end. All the cars, however, got through, but a description of them is unnecessary, being well known, and they are referred to later herein. The American cars were much the lightest.

A tremendous crowd looked on at Naas, but the Royal Irish Constabulary were quite equal to their task; they are a splendid set of men and carried everything through faultlessly.

REHEARSAL OF TIMING ARRANGEMENTS.

A run into Kildare for rehearsal of the timing arrangements afforded experience of a part of the cup route, and it was noted that much attention and expense had been bestowed upon it, this being but one of the directions in which the Automobile Club

and the authorities had exercised every forethought. There were not wanting those who were a little afraid the somewhat elaborate timing system might give way under the strain of the race, but so far there seems to have been no serious difficulty, and any question as to the accuracy of the times will, it is thought, not be possible. Writing just after the race, however, when all the times are not yet arrived at, owing to so many totals having to be accumulated, it is, of course, not possible to speak definitely, but all the numerous assistants were fully impressed with the national importance of their duties, and arrangements for thoroughly checking the figures were made.

LITTLE SLEEP WAS POSSIBLE

the night before the race, for the whole motor world seemed to have congregated for the time in the district, and even going to rest early was not much use, since those in Dublin were compelled to leave it about 2 or 3 a. m. to reach the course before it and all side roads were closed to traffic.

The morning opened gloriously and it was not too warm, owing to a brisk breeze. Making for the starting and finishing point, near the now historic Ballyshannon Cross Roads, the writer remained about that spot the whole day, for it must be remembered no one but the racers was allowed to move about the course on any pretext whatever—undoubtedly a very necessary rule—and therefore news of what was happening elsewhere was very difficult to obtain during



THE AUTOMOBILE CLUB'S GRAND STAND AT BALLYSHANNON CROSS ROADS.

dently gaining on him, having also been a complete double circuit. At this point Mooers was completing his first circuit, having apparently been in trouble. Jenatzy followed, completing his first double circuit. Winton, who started late, here completed his first small circuit and his engine was

NOT FIRING ALL CYLINDERS,

whether through a defect or through throttling could not be said, but the latter would not be probable. Owen completed his first double circuit, and then Gabriel, who had gained on him considerably, but whose engine was also missing.

At this point De Caters, who completed his first double circuit, pulled up momentarily and reported Jarrott upset but not hurt. Farman then completed his first double circuit. Then the hopes of the Englishmen sank, for De Knyff passed for the third time, having left Edge, but his

WATER WAS BOILING BADLY.

Foxhall Keene passed, having completed his double circuit, and it was then reported that Stocks had broken down badly. If true, only Edge was left for England and he was behind. Jenatzy passed for the third time, going grandly and keeping regular time.

A report then reached us that Edge was in trouble with tires and it seemed hopeless for the English and American teams. Edge, however, passed for the third time soon after, but his water was boiling to such an extent that he might almost have had a steam engine to propel him, and must apparently refill before long. Gabriel, De Caters and Farman all passed for the third time and then the weather changed and the rain came down, which laid the dust at first, but continued and gave the racers more trouble through grease.

Keene completed his third circuit, and then De Knyff and Jenatzy their fourth, both going grandly and, of course, now leading. Winton here completed his second double circuit, but apparently found difficulty in steering. Gabriel followed, completing his fourth circuit, but indicating he

WAS SKIDDING BADLY

and was not going full speed and lost some time about here.

Edge, De Caters and Farman all completed the fourth circuit. The rain, however, now ceased and the roads improved. Again De Knyff and Jenatzy followed round and passed for the fifth time—that is, two and a half complete circuits—both going well and with remarkable regularity, and still leading. Here it was reported Keene had stopped through a fractured axle. Gabriel passed for the fifth time, going very fast indeed. Winton completed his third circuit, going much better. De Caters, Farman and Edge all completed their fifth circuit, followed by Owen, who completed his third.

De Knyff and Jenatzy, between whom there were only a few seconds in time, again passed, this time completing three



PERCY OWEN GETTING READY TO START.

double circuits and entering on the last odd one. Both were going great guns. Gabriel, De Caters and Farman all passed at intervals for the sixth time, and then

A MOST UNPLEASANT DRIZZLE

and fine rain again made it very unpleasant for all, but did not appear to damp their enthusiasm a little bit, and though most of the spectators, sheltered with various tents, every time a car was signaled by telephone and steam whistle half a mile away, a stampede was made for the rails, and these looked like giving way once or twice, but, happily, stood the strain.

Owen passed for his fourth time, and not long after De Knyff and Jenatzy finished, this being about 5:45, the latter having done the best time.

A TREMENDOUS OVATION.

Both racers received a tremendous ovation and finished in perfect condition. Winton then passed for the fourth time, and Edge for his sixth, the latter stopping for inquiry, but quickly passing on. It was then learned for certain that Jarrott's steering gear had caused the car to capsize near Stradbally, and that his shoulder was dislocated and his mechanic crushed, but not sustaining any broken bones. They were taken to Athy. Definite news about Stocks came in that on the very first round after the Castledermot control he ran into a wire fence and overturned, being thrown out, but not hurt. This was said to be due to taking a wrong turning, but Stocks had had several weeks on the course. Gabriel



JENATZY, WINNER OF THE CUP.



STOCKS.



AT THE START.

KEENE.

and Farman finished next, both very fit, and were heartily cheered. Farman's water was boiling very much. Owen then completed his fifth circuit and stopped. De Caters, we learned, had suffered like Keene from a fractured axle at Athy, and could not finish. Edge arrived about eighth, and completed his three and a half circuits, having been further delayed on the road.

A car was then sent round the course exhibiting a large placard,

"RACE OVER."

At the time of writing, the morning after the race, the judges have declared Jenatzky the winner in 6 h. 36 min. 9 sec., over a course of 370 miles, equal to about 56 miles an hour all the way, which, on the narrow Irish roads, with a surface not too good, is marvelous work.

Only five of the twelve starters finished. The cup, therefore, goes to Germany, with France as runner up.

There were seven controls, and as time is lost on each occasion of slowing and starting—and things are cut down to seconds now in these competitions, the making of a slow start alone may lose the race. The course map will show that the route, although the best available over here, is not equal to the broad, straight roads of the Continent. The very successful way in which the race has passed off reflects the greatest credit on the Automobile Club officials and on the Irish Constabulary, and the conduct of the latter in dealing with the crowds was exemplary in every way, and they were equal to all emergencies, being resourceful and tactful.

THE LESSONS

One learns from the race are several. The enormous engines now fitted must have a limit somewhere. The weight limit with these engines cuts things too fine. Probably before long a different basis must be

taken for limiting, for instance, the cylinder capacity, and if, as in this year's race, there are no steam cars at all (although if there were a close formula would probably be found) matters are all the simpler. With one set of limiting dimensions for cylinders the effort to save by eliminating friction would be beneficial. The fuel consumption also should be taken into account. The spring system on a racing car is of vital importance, too, and is most severely tested.

Some of the cars were much steadier than others. The Napiers and Wintons appeared to jump about more than the Continental cars, while the Mors of Gabriel, with its overhanging body, seemed to have the most tendency to skid at speed. The Mercedes with the weight low down were better. The Americans did not seem at home with their cars at all, though the appearance of the Wintons was good and



FARMAN.



AT THE START.

GABRIEL. Digitized by Google

the drivers were praised for their efforts, in spite of hard luck. It is not yet known where Mooers stopped, or for what reason, but he only passed the starting point once, doing therefore only the first small circuit, and apparently dropped out soon after.

The cooling question on nearly all the cars appears to need attention: the weight is cut down and not enough cooling surface allowed, even with fans, consequently the water gets too hot for best results and boils away. The weight in most cars is brought more and more forward until, for starting and stopping, there is insufficient weight on the back wheels, with the result that they revolve without driving at starting and skid along by the brake locking at stopping, and this is most severe on any tire.

The Competing Cars.

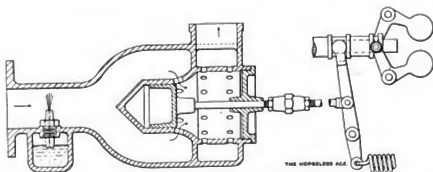
Twelve cars competed in the race, three each British, French, German and American. The English cars were painted entirely green, the French blue, the American red and the German white. Following are brief descriptions of the competing cars:

THE MERCEDES CARS.

The Mercedes firm intended to use 90 horse power cars in the race, but these were all destroyed in their recent fire, and they were therefore forced to use 60 horse power machines placed at their disposal by some of their customers. It is exceedingly doubtful whether the higher powered cars would have done better in the contest than those which actually ran, as in the Paris-Bordeaux race the better time was made by the 60 horse power cars. The 60 horse power cars have four cylinders of 5.6x6 inches; the 90 horse power four cylinders of 6.6x6 inches. Both inlet and exhaust valves are mechanically operated, and the former open directly into the combustion space. The engine power is controlled by varying the intake valve lift. Ignition is by hammer break spark supplied with current by a magneto. The transmission gear is of the sliding type, and the transmission to the rear wheels by separate chains. The frame and axles are of pressed steel, and a number of parts of I section are lightened by having holes drilled through the web portion. The weight of the car in racing trim is well within the 2,200 pound limit. Further details of this machine were published in THE HORSELESS AGE of June 17 last.

THE PANHARDS.

The Panhard cars, of nominally 70 horse power, also have four vertical cylinders consisting of separate steel castings. The cylinder jackets are made of corrugated sheet copper, and the cylinder heads are cast with jackets integral, and all four bolted together. The bore and stroke of this engine are 6.4 and 7 inches respectively, and the engine is rated at 90 horse power. Both inlet and exhaust valves are mechanically operated, and each cylinder has three separate inlet valves located close together



SKETCH OF PANHARD CARBURETOR.

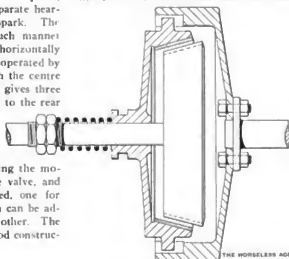
at the corners of an equilateral triangle. Each cylinder has a separate exhaust pipe, the four pipes leading into a large chamber at the side of the crank case. The crank case is divided on a horizontal plane, and the crank shaft has five separate bearings. Ignition is by jump spark. The clutch shaft is arranged in such manner that it may move freely both horizontally and vertically, and the clutch is operated by means of a rod passing through the centre of the shaft. The change gear gives three speeds only. The transmission to the rear wheels is by separate chains.

Some modifications have been made in the carburetor, doing away with the double levers usually transmitting the motion of the float to the needle valve, and double air intakes are provided, one for hot and one for cold air, which can be adjusted with relation to each other. The vehicle frame is of armored wood construction.

THE MORS.

The Mors car has a four cylinder vertical engine rated at 80 horse power (dimensions are not given). The four cylinders are separate castings and the jackets are made of aluminum and in pairs. Both exhaust and intake valves are mechanically operated, and are located in valve chambers on opposite sides of the cylinders.

Double cam shafts are used, and the cams are inclosed in casings. Ignition is by hammer break spark and magneto, the spark electrodes being located over the intake valves. The transmission is direct



SKETCH OF PANHARD CLUTCH.

on the high gear and by separate chains to the rear wheels. The frame is of pressed steel and is trussed by means of rods connecting the ends of the front and rear spring horns. The engine, as in the Mercedes, is secured directly to the main frame. The rear axle is of I section, and



MOOERS AT THE START.

the front axle is cranked to permit of placing the engine low. The frame is narrowed in front to allow of turning in a shorter radius. The feature of the Mors car which distinguished it from the rest is that it has a body resembling an inverted boat.

THE NAPIER.

The Napier cars are of the four cylinder, vertical engine in front type and have direct bevel gear transmission. Neither the dimensions nor the power of the engine is given, though it is stated the power is not exceptionally high, efficiency of transmission having been more depended upon for speed than abnormally high engine power. One feature of this car is the spring arrangement. The body frame is supported by semi-elliptic springs, but no shackles are used.

THE WINTONS.

The two Winton machines which were

of a disk clutch. The clutch is disengaged by a pedal which also applies the brake. The eight cylinder engine was in reality two four cylinder engines coupled together, and the other Winton car, driven by Percy Owen, was equipped with only one such engine. This car was by far the lightest in the contest, weighing only 1,450 pounds. It was also the lowest powered. The weight of the larger car was 2,150 pounds.

THE PEERLESS.

The Peerless 80 horse power car was fully described in *THE HORSELESS AGE* of April 15, and it will suffice here to state that it had a four cylinder vertical engine of 6 inches bore and 6 inches stroke and a direct bevel gear drive. The frame is of pressed steel. Both hammer break and jump spark igniters were fitted and the cylinders were made with steel liners and separate jackets. The drive was by bevel gears and live axle.

racers, but had mishaps both times. In the Long Island Boulevard race on November 16, 1901, he made a time of 56 2-5 seconds for a mile, with flying start, on a Mors machine.

THE FRENCH TEAM.

Rène de Knyff is a Belgian by birth and a naturalized French citizen. He is a director of the Panhard company and has taken part in races with this company's machines regularly for seven or eight years. He competed in all four Gordon Bennett cup races, but never completed except on this last occasion. He has, however, won many other races, particularly the "Tour de France," in 1900.

Henry Farman is an Englishman by birth, but also a naturalized Frenchman. He was formerly a bicycle racer, but since the beginning of the automobile movement has conducted an automobile storage station and agency in Paris, together with his



DE KNYFF.



AT SPEED.

GABRIEL.

used in the race differed from each other in that one had four cylinders and the other eight. In both the cylinders were arranged horizontally across the frame and all on the same side of the crank shaft. Only one carburetor is used for all of the cylinders, the engine speed and power are controlled by means of the Winton pneumatic governor operated by the foot, and the ignition is by jump spark. The transmission to the rear live axle is direct by bevel gears, there being only one speed and no reverse. The frame is made of armored wood. The wheel base of the eight cylinder car is 114 inches and the tread standard. The engine is geared down to the rear axle in the proportion of 1:1 1/4, and as the wheels are 32 inches in diameter (and fitted with 4 inch Goodrich tires), at an engine speed of 700 revolutions per minute the car will develop a speed of 54 miles an hour. It is claimed, however, that the engines can be speeded up to 1,000 revolutions per minute, which would give the car a speed of 77 miles an hour. The machine comprises many of the features of the regular Winton machines, except that it has a conical clutch instead

The Drivers of the Cars.

The rules of the cup race require that the competing cars must be completely manufactured in the country they represent, and that the drivers thereof must be members of the club for which they compete, but no limitations are placed on the nationality of the drivers. The manufacturers of the competing cars were, of course, eager to secure the most promising drivers—those combining daring with skill and calculation—and only one of the clubs represented (the German) interfered with the choice of the manufacturers. The German club would not admit professional drivers to membership, and as the Mercedes firm could not find any satisfactory drivers among the higher classes in Germany they were forced to appoint foreigners. Their choice fell upon Camille Jenatton, a Belgian engineer and noted automobile racer; Baron de Caters, a noted Belgian sportsman and successful automobile racer, and Foxhall Keene, an American capitalist and dashing polo player. Keene competed in the Paris-Vienna and Paris-Madrid

brother Maurice, and has competed in many races, always with Panhard cars.

Fernand Gabriel achieved distinction in the racing world by winning in the Paris-Bordeaux section of the Paris-Madrid race recently, establishing a new average speed record of 65 1/2 miles per hour. He is a professional automobile racer, and prior to his engagement by the Mors firm, whose car he drove in the cup race, he drove for Darracq.

THE BRITISH TEAM.

All three of the English drivers are London agents for English and foreign cars. S. F. Edge was born in Sydney, Australia, in 1868. He was taken to England in his infancy, and as a young man became a cycle racer. Later he became a director in the Dunlop Tire Company, and several cycle manufacturing companies, and in 1896 he entered the automobile business, promoting in succession a considerable number of automobile manufacturing companies. He early took to automobile racing, but did not score any particular successes until, in 1902, he won the Gordon Bennett cup in the race from Paris to Inns-



BARON DE CATERS BEFORE THE START.



JENATZY AT FULL SPEED.

bruck, Austria. Edge has the London agency for the French Gladiator and English Napier cars.

Charles Jarrott is a native Englishman, and since 1896 has been connected with British agencies or concessionaires for Continental cars. He participated in all the leading races on the Continent during the last three years, winning the 1902 Circuit des Ardennes, securing second place in the 1902 Circuit du Nord, arriving second in the 1903 Paris-Bordeaux and doing well in the Paris-Berlin and Paris-Vienna races. He has been in the United States, and at present represents the De Dietrich car in England.

J. W. Stocks was formerly a bicycle racer, and has for some years been the manager of the De Dion business in London. He has done a great deal of automobile driving, but had not figured in any large races before the Gordon Bennett race this year.

THE AMERICAN TEAM.

Alexander Winton, who was appointed to represent the A. C. A. on the strength of his former track racing successes, was born in Scotland and came to America twenty-five years ago, at the age of twenty. Winton is one of the pioneers in the auto-

mobile movement in this country, and before entering the automobile line was engaged in the manufacture of bicycles. He is president of the Cleveland company which manufactures the machines of his design. During the first years of his automobile career Winton established a number of long distance road records; in 1900 he went to France to compete in the first Gordon Bennett Cup race, but made only a poor showing, his machine being of insufficient power and the tires failing. Later Winton took to track racing and for nearly two years held all track records from one mile up.

Percy Owen, the Eastern manager of the Winton Company, was born in New York State and is twenty-eight years old. He has raced Winton cars in a number of track and short distance road races, and in the Staten Island race about a year ago he established a new mile record for cars between 1,000 and 2,000 pounds in weight.

Louis P. Mooers, the third American driver, is mechanical engineer of the Peerless Manufacturing Company, of Cleveland, and the designer of the car he drove, as well as the regular service cars of that company. He is a native of New England and thirty years old. Mooers achieved

some success in the Brighton Beach races in August last year, and since that time paid considerable attention to racing cars, but had never before driven in a long distance road race.

The Napier Steering Gear.

Weakness in the steering gear was one of the causes of defeat of the English team. It will be remembered that in the Paris-Madrid race Mark Mayhew, driving a Napier, broke his steering gear not far from Bordeaux. Jarrott (Napier) broke his steering gear in this race, and it appears that Stocks also was put hors de combat by a defect in his steering apparatus. He had been practicing on the course for two weeks, more or less, and it is inconceivable how with the precautions in marking the route, etc., he could have taken a wrong turn. Edge's car was also seen to steer rather badly.

The Napier steering gear is of the worm and sector type, and is illustrated herewith. The worm and sector are mounted in a casing, which is provided with two brackets A A to fasten it to the vehicle frame, and with a third bracket B, to which the clutch and brake pedal is pivoted. Any



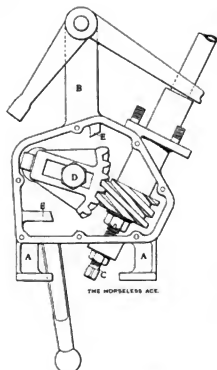
JARROTT.



WINTON.



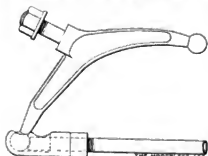
EDGE.



NAPIER STEERING MECHANISM.

end play developing in the bearing of the worm can be taken up by means of set screw C and the lock nut on it. The worm sector is made in two parts in order to enable adjustment to be made to obtain a perfect mesh of the teeth. The part carrying the teeth is made with a slotted arm, in the slot of which fits a projection of the pivot part. The two parts are clamped together by a cap screw D, and adjustments of the meshing parts can be made by simply loosening this screw and shifting the sector along its guide. Two stops E E within the case limit the motion of the worm sector.

The joint of the steering fittings and connecting rods is of the ball and socket variety. The end of each of the lever arms to be connected is turned with a ball. The



NAPIER STEERING JOINT.

connecting piece is thimble shaped, and has two overlapping holes drilled in its side wall of unequal diameter—one large enough to let the ball pass through and the other, smaller one large enough to allow the stem inside the ball to have free motion. The connecting rod is screwed into the open end of the thimble against the ball, thus holding it in the smaller one of the two holes, and is secured by means of a lock nut.

Gasoline and Steam Cars Compared.

BY ALBERT L. CLOUGH.
(Continued.)

ECONOMY OF OPERATION.

The fuel consumption of a gasoline vehicle is small in comparison with that of a steam car of the same class, and this is due to the direct manner in which the energy of the fuel is applied in the former vehicle. The gasoline which is burnt to raise steam in the steam vehicle gives a large part of its heat to the surrounding air through the chimney gases and radiation from the boiler, and the conversion of the heat into mechanical power by the small steam vehicle engines is very wasteful.

The average gasoline motor, despite its large loss of heat to the cooling water and in the exhaust, is capable of doing more than twice the work with the same quantity of gasoline than could be accomplished by the average steam vehicle engine and boiler. Those gasoline engines of liberal stroke and bore, which operate with high compression, a fairly high degree of expansion and moderate speed, are remarkably economical of gasoline, while the small, short stroke motors of very high speed are in general decidedly less efficient.

It is not uncommon to find gasoline cars of 2,000 pounds weight which will travel decidedly further on each gallon of gasoline than a light steam runabout of less than half the above weight.

The use of highly superheated steam, the prevention of radiation from the boilers, piping and engines of steam cars, and the furnishing of warmer feed water by the application of feed water heaters or the return of the exhaust water from air condensers have lately much increased the economy of operation of steam vehicles, but the fact still remains that the fuel consumption of a large gasoline touring car is generally found to be less than that of a light steam runabout for the same service.

The successful use of kerosene for steam raising is much more imminent than is its application to internal combustion motors, and when its use in vehicle burners is fully accepted its economic superiority over gasoline will at least reduce the present discrepancy in the cost of operation of the two motive powers.

The cost of ignition batteries is an item in connection with gasoline vehicle operation which goes very far toward offsetting the inferior fuel economy of the steam car. This item is largest in cases where high speed multi-cylinder motors are employed, and least in instances where single cylinder moderate speed motors are used. If mechanical spark generators are employed the expense of ignition current is practically nil.

As a rule, somewhat more cylinder oil will be required for the lubrication of a gasoline motor than a steam engine, as the cylinder area is larger for the same service. The multi-cylinder gasoline engines which are now very popular consume

a good deal of cylinder oil, and gas engine oil is somewhat more expensive than oil only intended to withstand steam temperatures. The cost of lubrication will generally prove somewhat greater in the case of the gasoline than that of the steam car.

DURABILITY.

Since so large a proportion of all the steam vehicles in use has been constructed upon altogether too light lines for successful general use, and since the liberal use of material has been such a general rule in the construction of the engines and running gears of gasoline vehicles, a comparison of the average representatives of the two motive powers is most unsatisfactory. There are plenty of exceptions to the above statement, and recently steam carriage builders have put out vehicles which, for durability, should certainly not be inferior to those operated by the other motive power. It may, however, be said with truth that in the past at least steam cars in general have not shown the durability of the gasoline rigs, owing to the very high speeds of their engines, the scant wearing surfaces, the questionable use of ball bearings and their entire lack of protection from road dirt.

The majority of gasoline engines have, on the contrary, always enjoyed the advantage of liberal plain bearings, lower speeds, stronger parts and enclosure from dust. Some of the large slow speed American gasoline engines constructed four and five years ago are frequently found to have a good deal of service in them even now, after continuous use, for they are simple and liberal in design. It might prove difficult to find any such "veterans" among steam vehicle engines.

I believe, however, that there should be no inherent difference whatever in point of durability between the two motive powers. Steam engines will be, and indeed have been, designed which must enjoy at least an equal durability with internal combustion vehicle motors. Indeed, it would be quite natural to assume, from theoretical reasons, that the impulsive action of the explosion engine ought to result in wear which must always, by the nature of the case, be more extensive than that occasioned by the more constant force exercised by steam pressure. It can hardly be said that this view is warranted by experience, but rather that, so far as the past is concerned, steam vehicle engines have suffered in comparison with gasoline motors when relative durability is considered.

It is to be remembered that gasoline cars possess clutches with frictional surfaces and gears, which are in use a part of the time, and that all these parts are subjected to stresses which are somewhat impulsive. On the other hand, steamers possess burners maintained at high temperatures, boilers subject to the action of all kinds of waters and the direct action of flame and quite an intricate system of pumps, piping and valves. Super-

heated steam, too, is capable of doing a deal of "cutting" wherever it is applied.

In point of fact, we know very little of the relative durability of the vehicles of the two motive powers as yet. Styles and systems have been so rapidly changing that very few vehicles have been allowed to wear out, but have been rebuilt or retired for other reasons than general depreciation. It will be a matter of some years before this point is set at rest.

WATER CONSUMPTION.

While much improvement has been effected in the water economy of steam vehicles of late, the frequent stops on the road for the purpose of refilling the tank and the constant watchfulness required to "make" watering points before the supply is exhausted constitute great objections to the use of this motive power. I have a friend who operates one of the very best steam vehicles, and who tells me that he makes it a rule to stop every six miles to fill his tank, for fear that he may be caught in some district where water is inaccessible and run short. This is an extreme case. His supply would probably carry him over 15 miles, but he wishes to be on the safe side.

On hard country roads the average steam vehicle user may be expected to renew his supply about every 15 miles. Of course, this figure is not exact, and it should be said that the vehicles using superheated steam and air condensers make very creditable distances with the large tank capacities now supplied. Vehicles not provided with these modern improvements demand very frequent refillings. However, in most settled parts of the country good soft water, free from much organic matter, is generally obtainable at very frequent points along the road, and by means of the ejector and hose which modern steam vehicles generally carry the tank may be refilled without undue inconvenience.

The replenishment of cooling water on the road is something which should not become necessary in the operation of a first class gasoline car. The supply will not be diminished by evaporation in any single day's run, unless the cooling system is of most antiquated design. Some gasoline vehicles may still be found which employ gravity circulation, and which have insufficient radiating surface or tanks placed where they receive none of the cool breeze. These vehicles will occasionally have to stop for cooling water, and some of them may have to renew their supply as frequently as a steamer, although the amount of water needed is quite small. When circulating pumps are used, with plenty of flanged radiators, and tanks fanned by the breeze of the vehicle, the cooling water will last indefinitely.

The rapid rise of the air cooled internal combustion motor has demonstrated the practicability of entirely eliminating the use of water in the operation of gasoline cars of moderate power.

SMOOTHNESS OF OPERATION.

To secure a rapid forward motion, free from any periodic increase and decrease in its rate, free from any up and down tendency and devoid of any vibration of the vehicle body, is the ideal which is aimed at in the design of motor pleasure vehicles. The steam vehicle realizes this ideal with sufficient closeness, owing to the comparative lightness of the reciprocating parts and the very slight variation in angular velocity of the engine.

It cannot be claimed that the gasoline car is nearly as perfect in this respect. In a single cylinder slow speed horizontal engine, even when provided with a liberal balance wheel, there is a considerable variation in angular velocity at different points of the cycle, enough, indeed, to produce, when the engine is running at quite low speeds, a perceptible forward jerk of the car at each explosion stroke of the motor. When, however, the engine is speeded up, this defect becomes barely perceptible.

A high speed vertical engine when unduly slowed down produces a decided up and down motion in the vehicle, and when speeded high communicates very rapid vibrations to the carriage body which are said to "put one's foot to sleep." The double cylinder twin type of motor is somewhat less of an offender in this regard, and the double opposed cylinder engine can hardly be said to be at all objectionable in point of unsteady running. The three cylinder motor furnishes a sufficiently close approximation to uniformity of angular velocity and balance of reciprocating parts, and when the four cylinder type is reached the smoothness of the torque and the balance attained by the several pistons and connecting rods are so perfect as to leave nothing to be desired.

Perfect steadiness of running is thus only attained in gasoline engines by the multiplying of the cylinders and necessarily at the sacrifice of simplicity. The expected advent of the two cycle engine into general automobile practice may result in much greater smoothness of operation with a minimum increase in engine complication—perhaps with an actual decrease.

A word should be said in commendation of the steadiness of operation of the single cylinder horizontal engine which has large flywheel capacity, well proportioned balance weights, not too high compression and an automatic spark governor. American designers have attained about all the steadiness of which the type is capable.

A steam car can be started from rest with rather less vibration than the same operation involves in a gasoline car, for the reason that the hoiler reserve is drawn upon and immediately produces a steady torque. In order to furnish the considerable amount of energy necessary to accelerate a gasoline car the motor must be speeded up to furnish power at the

requisite rate (since it possesses no reserve), and then a slip allowed in the clutch to render the acceleration sufficiently gradual to be comfortable.

All these questions of vibration appear more serious on paper than they do in practice, and to anyone not unusually finical they are of hardly more than academic importance in comparison with more vital considerations.

(To be continued.)

Tricks in Races.

Georgia Knap, a French manufacturer, claims in an article in *La Locomotion Automobile* that many deceptions have been practiced in the classification of vehicles entered for the Paris-Madrid and other races. The vehicles usually are weighed the day before the race. On the occasion of the Paris-Madrid race he saw among the vehicles being weighed some with a single speed gear only, false springs, the very smallest size of tires on heavy vehicles, no tubes on the inside, bonnets of oil cloth, seats consisting of packing cases, and all others removed. The tanks were of microscopic proportions and everything was just sufficient to run the machine off the scales under its own power.

In the motor cycle class the same tricks were resorted to—machines of 6 horse power were entered in the class under 110 pounds. Considering that the ordinary road machine of a horse power weighs more than 110 pounds, the question arises, How was this feat accomplished? It was a very easy matter, however, for the machines were equipped with so called racing tires, racing wheels and a racing saddle; had one-half of their bolts removed, as well as the chain, pedals and crank. I saw one saddlepost of wood which had been given a metallic appearance by means of bronze powder. Tanks were seen holding about a quart, handle bar tubes as thin as paper, and in some instances even drilled with numerous holes. The tire security bolts and other parts had been removed; the wiring consisted of bellhanger's material and the coils were attached by means of straps or strings. By such means the weight was reduced to a total of 109.99 pounds.

The day following, however, at the start, it was no longer the same vehicle; everything necessary to insure safety had been put back in place. The general outline had remained the same, which fooled the starting officials, but many minor parts had been replaced to cope with the hard test, and in consequence the weight had been raised by just the amount of these parts.

That motor bicycle pacing in cycle races is dangerous has been abundantly proved, and the National Cyclists' Union, the body which controls cycle races in Great Britain, has resolved to forbid it in the future.

Maintenance and Repairs.

X.—Burner and Boiler Repairs—Improvements of Throttle Valves.

By W. O. ANTHONY.

It happens frequently that a machine which has been steaming well all at once begins to fall off in its ability to generate steam without apparent reason. A frequent cause of this trouble is the clogging of the vaporizing tubes which pass through two of the boiler flues. After a period of use the gauze in these tubes becomes so filled up with carbon produced by too great heating of the gasoline, and owing to the natural corrosion of the gauze itself, that little or no gasoline can get through, resulting in an insufficient supply of gas to the burner. This gets so bad at times that the old, burnt gauze cannot be pulled out but must be drilled out.

CLEANING THE VAPORIZER.

To do this the union on top of the boiler must be disconnected and the piping and fittings removed, so as to expose the ends of the flues carrying the gauze. Then the unions outside the boiler must be removed and also the nipples and elbows, to expose the lower ends of these same flues. For a drill to remove the gauze in case it cannot be pulled out with a stiff hooked wire, a



FIG. 13. FIG. 14.

Syracuse twist drill for the bit stock about 18 inches long and $\frac{3}{4}$ or 5-16 inch diameter is as good as anything. Care must be exercised in drilling to avoid cutting into the bore of the tube with the drill. New gauze should be put in, and it is well not to roll it to fit too tightly into the flues. It should be rolled quite closely and only large enough outside so that it may be pushed in the whole length with the fingers. Nothing but brass gauze should be employed, of the kind that is used in milk pan strainers, which is kept by nearly all tin shops.

In remaking the pipe joints yellow soap should be applied to the threads, as this will almost certainly insure a tight joint.

EXPANDING BOILER FLUES.

It is now rather a rare occurrence that a steam carriage user will burn out his boiler owing to carelessness in maintaining the water level; yet such a thing may happen, and a few hints regarding expanding of flues may not be out of place.

A simple taper plug tapped lightly into the flue will sometimes effect a remedy for a leaky tube end, it being driven out by a rod from the other end. Quicker and

more reliable work may be effected with a roller expander. This must be used very carefully, however, as it is an easy matter to cut through the one-thirty-second inch copper tubing almost universally used in the conventional type of fire tube boiler. The tool should be driven in very lightly and turned backward and forward through about one complete turn, applying some pressure with the hand while turning.

Generally, in case of a scorched boiler, nearly all of the tubes are leaking and must be expanded before steam can be generated and maintained, but if only a few of the tubes, say a half dozen or so, leak, wooden plugs cut from soft pine may be driven into the defective flues at the bottom, and many times steam may be raised and progress made with the machine in this condition, thus avoiding a tow home.

In many of the burners in use the air tubes in the burner in time burn through and must be replaced with new tubes.

With a small, sharp cold chisel cut off the bead or part where the end of the tube is flanged over, and drive the tube back and out of the other side with a steel mandrel made to the same diameter in the body as the outside diameter of the tube, and having a part for about one inch at the end turned down to fit inside the tube. Fig. 13 shows this tool.

Cut the new tubes, of copper, about one-eighth inch longer than the thickness of the burner outside to outside. Now insert the tube in its hole, with about one-sixteenth inch projecting over each end, and with a tool like that shown in Fig. 14 turn over or beat one end at a time by inserting the tool and striking a few sharp blows with the other end of the tube against something solid, as a hardwood block upon an anvil. This tool should be made as shown, with a slight fillet, which will tend to give the ends of the tubes a rounded form.

LOCK FOR STUFFING NUT.

The stuffing nut upon the throttle stem in many machines is not provided with any means for locking against the tendency to work loose by vibration. A very simple and efficient device to accomplish this, and one which permits of repacking the throttle stuffing box without detaching any of the parts, is shown in Fig. 15.

A is the throttle stem and B the stuffing box nut which it is desired to lock. Take a piece of strap iron wide enough to allow of cutting out a slot of the same width as the dis-

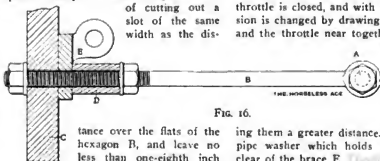


FIG. 16.

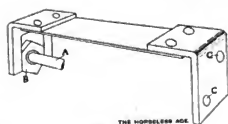


FIG. 15.

of metal on either side and about one-eighth inch thick. Bend this at right angles, and to the bent part rivet one end of a piece of spring steel (heavy clock spring will do). This spring will have to be heated at the end to soften enough so that it may be drilled. Get the distance from the outside or forward end of B to the inside of the seat brace. Bend another piece of similar strap iron and drill two holes C C, as shown, for No. 10 wood screws, and after cutting the spring the proper length to allow this second piece to reach the front brace and the slotted piece to be about midway of the throttle nut when in its tightened position, rivet this to the free end of the spring. The action of this will be obvious. To tighten or remove the nut it is only necessary to spring the slotted piece away from it.

TENSION OF THROTTLE LEVER.

In many steam machines the adjustment for the tension upon the throttle lever is made by disconnecting an eye which is screwed to the body of the throttle, and turning the shank of this piece in or out the right amount.

This is a very tedious operation and one which tends to strain adjacent parts, as the shank is threaded into a piece of metal screwed to the inside of the front seat brace. Drill out the hole into which the piece screws large enough so the rod will just slip through, and run a nut upon the threaded portion inside and outside the seat brace, with a common washer outside and a washer cut from a piece of gas pipe inside, so the nut will clear the parts of the lever which come very close to this point. For this purpose the thread upon the eyebolt will have to be run down quite a little. With this arrangement the tension may be altered at any time by loosening one nut and tightening the other.

This arrangement is shown in Fig. 16. In this figure A is the cap screw which threads into the body of the throttle, and B is the eyebolt which determines the tension upon the throttle lever when the throttle is closed, and with which this tension is changed by drawing the seat brace and the throttle near together or separat-

ing them a greater distance. D is the gas pipe washer which holds the inside nut clear of the brace E. Digitized by Google

TOURING IN

→ → AMERICA.

IV.—Southern New Jersey.

By C. H. GILLETTE.

While Southern New Jersey does not offer the same variety in scenery that many other sections do, it is, nevertheless, an interesting touring ground, rich in popular resorts and points of historic interest. The majority of the roads there are perfectly available for automobile use. The macadamized thoroughfares and county roads form a network of magnificent highways, on which the tourist can travel from point to point without difficulty. The cross roads will have to be used only occasionally, to reach special points of interest or as short connecting links and time savers. The county roads are for the most part made of gravel, and owing to the method of their construction are as smooth and stable as macadam, in most instances.

From New Brunswick south (with the exception of the western part of the State) the country is merely undulating. I do not mean by this that there are no hills to be climbed. The hills are there, but the worst of them are comparatively easy. In a distinctly hilly or mountainous country the roads almost invariably wind around the inclines, while in Southern New Jersey they are very apt to go right over and along the top of the hills, which are

not so high as to make these climbs impractical for touring cars. For the most part, however, the roads are what may be called "almost level."

It is fortunate that this territory is so easy of access to the two large cities, New York and Philadelphia, for it affords the many automobilists of those great centres who do not care to undertake long and difficult trips a delightfully easy and at the same time profitable touring ground. With its chain of ocean resorts it offers attractive "over Sunday" trips during the summer season, and because the means of reaching these resorts are good and the conveniences at the watering places excellent for man and car, there is nothing to detract from the pleasure and enjoyment of such outings.

Considered as a touring territory tributary to New York, New Brunswick is the gateway through which everyone must pass. Plans have been made for a bridge crossing the Raritan River from Perth Amboy to South Amboy, and when this bridge is completed (as it probably will be in about a year and a half) it will afford a more direct means of getting to the coast from New York and shorten the present route by at least 20 miles.

By far the pleasantest route from New York is by way of Staten Island, taking the Whitehall street ferry to St. George and following along the eastern shore of the island through New Dorp to Tottenville, where the ferry is crossed to Perth Amboy. Three blocks from the ferry at Perth Amboy take the right fork to Perth Amboy

road, which leads direct to Metuchen. After crossing the railroad, turn to the left into the turnpike, which should be followed straight into New Brunswick. The route through Staten Island, with the exception of a very short stretch near Tottenville, is good macadam and affords a view of the lower bay with the Staten Island hills to the right. It is not the least attractive portion of the tour.

From New Brunswick there is a macadam road all the way to Trenton. Unfortunately the direct road from New Brunswick to Trenton, which leads through Franklin Falls, Kingston, and Princeton, is almost impassable as far as Kingston; but from there into Trenton it is excellent. The good road is somewhat roundabout, but it is the only way by which to make the run. It leads through Deans and turns to the left through Dayton and Cranbury to Hightstown. From there it is along the railroad to Windsor and then right through Edinburgh and Mercerville to Trenton.

FROM TRENTON TO PHILADELPHIA

The direct road is again the poorer, the good road being on the Jersey side through Bordentown and Burlington to Camden. This road is macadam for nearly all of the distance, so that it gives a macadam road practically from New York to Philadelphia.

For anyone wishing to get away from this highway and take a comparatively unused route to Philadelphia, there is a perfectly available road through Plainfield to Somerville. From there on only dirt roads are to be found, but being for the most part in good condition and with comparatively easy



THE BOARD WALK AT ASBURY PARK—JUST BACK OF WHICH IS THE OCEAN DRIVE.



"THE OCEAN DRIVE IS A BEAUTIFUL BROAD BOULEVARD LEADING THROUGH ALL OF THE POPULAR RESORTS."

grades, the trip is perfectly possible. The route is through Three Bridges and Mt. Airy (taking the right fork around the mountain instead of going over it) to Lambertville on the Delaware River, crossing the river there to New Hope and following the old York road through Willow Grove and Jenkintown into Philadelphia.

The scenery on this route is new to most tourists and gives much more variety than the main road. There are plenty of mountains and hills and the Delaware River is particularly beautiful at the point of crossing. Lambertville is not more than 17 miles above Trenton. In this connection it may be noted that one of the most delightful trips imaginable is to follow along the river to this point, passing by the spot where Washington crossed on the memorable occasion when he completely surprised the British army in the midst of their Christmas festivities.

A very good road leads north along the river from Lambertville to Easton, crossing the river at Stockton to Lambertville on the Pennsylvania side and again at Uhlerstown to Frenchtown on the New Jersey side. Still following along the river to Milford, another crossing is made to Bridgeton, Pa., and from there the road leads through Knitersville to Easton. The road is level almost the entire distance and, although for the most part a dirt road, is in good condition. There is a stretch of bad road with a heavy grade between Point Pleasant and Uhlerstown, but the annoyance of this poor stretch is more than compensated for by the beauty of the scenery.

Turning again to the shore the route can perhaps be best described by giving the experiences of the writer on a trip made about two weeks ago for the purpose of getting some photographs and finding out the condition of roads this summer.

Starting from Orange, the route was

through Springfield, Scotch Plains, Plainfield and Metuchen to New Brunswick, the entire route being over the finest kind of macadam. From there, turning to the left into Burnett street, almost opposite the Mauson House, we followed a straight macadam road to Old Bridge. There were a few hills to be taken on this road, but the condition of the road was so good that they did not offer appreciable obstacles to easy running.

After crossing the river bridge, we took the left fork and followed along the main macadam road to Mattawan, a practically level run. Here we turned to the left to Keyport. Just beyond the station we turned to the right and then took the first left fork, which leads through Middletown to Red Bank. The road here, although not macadamized, is as good a dirt road as one could ask for. The grades are com-

paratively easy, although it is up hill almost all of the way from Keyport to Middletown.

From Red Bank we took the Rumson road, which is one of the most beautiful drives anywhere along the coast. For the most part this road is kept in splendid condition, and is a broad boulevard, with magnificent residences and estates on either side. It leads direct to Seabright, where a stop for gasoline and lunch was made. The total distance to this point is 59 miles.

Another way of going from Red Bank to the shore is to go straight out Broad street, through the beautiful old town of Shrewsbury, one of the oldest towns in that part of the State, and intensely interesting. From there, the road is straight on to Eatontown, where a turn to the left along the line of the trolley brings you to the shore at Long Branch, over 8 miles of good, level macadam road. From Seabright the ocean drive leads south along the shore practically all of the way to Point Pleasant. It is a beautiful broad boulevard, leading through all of the popular resorts along the Jersey shore.

We took this drive, passing the little fishing settlement of Nazareth and the life saving station, where, by the way, it is well worth one's while to make a stop. The guards at the station are always courteous, and will show the tourist much of interest in the way of life saving apparatus. Just beyond is Monmouth Beach; then come North Long Branch and Long Branch. Between there and Asbury Park are West End, Elberon, Deal Beach and Allenhurst, so close together that it is almost impossible to tell where one ends and the next commences. Asbury Park, with its board walk and magnificent beach, is always interesting and always worth a stop.

From Asbury Park south the settlements are a little farther apart, and as the road is a little farther back from the shore, you see more of the country. We went straight



"DIRT ROADS * * * ALMOST AS GOOD AS MACADAM."



THE ENTRANCE TO ALLAIRE.

out Main street, crossed the bridge over the Stark River, through Belmar to Lake Como, where we turned to the right, away from the shore, and followed a direct road to Allaire. This place, which has come to be known as the "deserted village," is one of the most interesting spots along the Jersey coast. It was founded by one Allaire, who built there an iron foundry with the expectation of getting Government work in connection with ship building. He built up around the foundry a village to accommodate 200 or 300 people, but as he was unsuccessful in this project the houses were occupied for only a short time. Everyone moved away except the Allaire family, the last member of which died about two years ago. The majority of the houses have been destroyed by fire, and their ruins and the air of desolation which pervades the place forcibly remind one of Goldsmith's famous "Deserted Village."

Just beyond Allaire we came upon a small settlement called Squankum. From here the road to the left leads direct to Lakewood, the attractions of which place are too well known to need any comment. Not having time, however, to stop over, we turned to the right to Farmingdale and continued on along the main road to Freehold. The roads from Asbury Park to this point we found to be excellent for a great deal of the distance, being made of macadam. From Freehold the route is out Throckmorton street, close to the railroad through Tennert and to Englishtown. This road was just being repaired and offered the only bad stretch which we found on the entire trip. In the course of a few months the work will be complete, and it will be one of the best roads in that part of the State.

The country around Freehold is full of historic spots, it having been the scene of the famous Revolutionary Battle of Monmouth, which Freehold celebrated on June 28 in a very fitting manner. The State

troops enacted a sham battle, going through the same manoeuvres as were employed in the real contest.

We saw several sign posts along the road from Freehold to Englishtown, marking various spots of historic interest. One of these we noticed with special interest, as it designated the spot where General Washington, meeting General Lee in retreat, uttered his famous "Damn you, sir!" and by his righteous indignation and anger turned General Lee's retreating troops about and saved the day.

From Englishtown on, the road is good to Jamesburg, where a turn to the right along the railroad took us over splendid macadam through Helmetta and Spotswood to Old Bridge, from which point we retraced the morning's route to New Brunswick. We stopped for dinner and finished the run back to Orange, a distance of 25

miles, in a driving rain, the first unpleasant experience of the day. The distance which we covered, nearly 100 miles, is altogether too far to be made with comfort in a single day, and the trip as outlined above should be divided into two days, making the night stop at Asbury Park or Lakewood and returning leisurely on the following day. This route offers any number of variations, but the description given will show the possibilities for a similar trip, laid out to include other points of interest.

The roads south of Lakewood, with the exception of those between Trenton and Philadelphia and in the vicinity of Atlantic City, are not quite as good as those along the upper shore. Everyone is more or less familiar with the run from Philadelphia to Atlantic City. It is an almost straight, level, macadam and dirt road, in splendid condition the entire distance of 60 miles. This, of course, is the main thoroughfare from Philadelphia to the shore. There is a very good road through Woodbury and Woodstown to Salem and from there through Bridgeton, Millville and May's Landing to Atlantic City. This distance is, of course, very much longer, being more than 100 miles. The country is almost flat and does not afford much in the way of scenic beauty.

AROUND ATLANTIC CITY.

From Atlantic City it is possible to go north along the shore to Asbury Park, and, if one were inclined, a complete circle of Southern New Jersey could be made by the trip to Atlantic City as outlined above, and from there to Seabright and New Brunswick, then to Trenton and back to Philadelphia.

The Atlantic City-Asbury Park run is not especially interesting, except when it passes through some quaint old towns. The route is through Pleasantville, Absecon, Port Republic, New Gretna, Tuckeron, Barnegat, Toms River and Lakewood, and



"THE DESERTED VILLAGE."

from there either by way of Point Pleasant or Allaire. A new road between Point Pleasant and Lakewood is now practically completed and work is also being done on the road from Toms River to Lakewood. The road through Barnegat to Tuckerton will probably be completed within a year, some of the contracts having already been let. When this road, which is an ordinary dirt road now in fairly good condition, is finished it will afford a magnificent drive from Seabright to Atlantic City, and none will appreciate it more than automobilists.

From Atlantic City it is possible to go to Cape May, the road being good to May's Landing. From there a dirt road in fair condition extends through Tuckahoe and Seaville to Cape Court House. From there on, for 13 miles, is good macadam. It will be seen from the foregoing that with the exception of from 25 to 30 miles between May's Landing and Cape May Court House, it will soon be possible to travel from Sandy Hook to Cape May over a level macadamized road.

From Philadelphia to Lakewood there is almost a direct road leading out through Mt. Holly to New Egypt. The road to that point is in good condition, but unfortunately from New Egypt into Lakewood, a distance of 18 miles, is a sand road which would be very trying to the automobile. It is to be hoped that this road will be improved soon, as it would open up a direct road from Philadelphia to the northern shore resorts and make them almost as easily accessible as Atlantic City. At present the best way to go is to Trenton on the Jersey side and from there through Hightstown to Freehold.

Inasmuch as Southern New Jersey is active in the building of new roads and keeping them in proper condition, its availability as a touring ground will steadily increase, and as the mileage of good roads increases the interest of automobilists in this section will grow. Its attractions will draw tourists, traveling from north to south, away from the main highways to try its bypaths and see its points of interest and beauty.

During the past few months it has been called very forcibly to the writer's attention that tourists are looking more to these side trips and are confining themselves less and less to the much traveled roads between the larger cities. It has been the writer's pleasure lately to lay out several tours taking in sections rather than points. We have now in the East so many of these sections that are available as touring grounds and closely connected by good roads that tours of almost any length can be easily and conveniently made, taking in side trips, yet going over none of the ground twice, and gradually working back and forth through attractive localities and gathering information regarding whole States rather than becoming acquainted with one or two cities and a single road through them. This is ideal touring.

-COMMUNICATIONS-

Racing Under Restricted Cylinder Volume Rule.

MANCHESTER, N. H., July 6.

Editor HORSELESS AGE:

Your recent editorial entitled "Racing Under a Restricted Cylinder Volume Rule" is very much to the point. It is extremely improbable that racing under this or any other restriction can make any substantial contribution to the industry. With a restricted cylinder volume, the methods in which higher speeds could be obtained are somewhat as follows:

1. By a reduction in vehicle weight and a corresponding increase in its "ability."
2. By an increase in piston speed.
3. By the use of a higher explosive than gasoline for the fuel.
4. By a refinement in the transmission mechanism.
5. By the reduction in air resistance.
6. By the use of dangerously resilient tires.

Almost all of these methods would lead development along uncommercial if not along dangerous lines.

The first would develop a vehicle so frail and light as to be unfitted for anything but track work and would set a bad example to designers of vehicles intended to be used for utilitarian purposes. It might even set us back into the "bicycle" period from which the industry has but imperfectly emerged.

The second would give us motors of short life and poor efficiency on account of low expansion, and would generally set manufacturers off the track toward a rational and durable design with low fuel cost.

The third would cause a search after some fuel which would produce a higher effective pressure than does gasoline vapor and would probably result in the use of dangerously explosive materials which, for various economic reasons, could never be of practical value. The whole tendency would be to get the maximum output out of a motor of a certain size without the slightest regard for economy, while, in any rational development, economy should figure with output as a consideration of at least equal weight.

The fourth might possibly prove of some assistance to the industry, but this is very problematical, as in most first class vehicles the transmission is already sufficiently direct and reasonably satisfactory.

The fifth would result in the design of "freaky" vehicles of useless form so far as business or pleasure purposes are concerned, and the sixth is obviously to be condemned.

I believe that racing under the restricted cylinder rule would be more harmful

to the industry than when not so regulated, as designers would be driven to more harmful subterfuges in order to achieve their purposes.

The fact is that racing vehicles are so different in purpose from pleasure or business vehicles as to have hardly any qualities in common with them. Since it is evident from recent events that Americans are not very successful automobile racers, why not give up the "jockey" end of the business and buckle down to the design and manufacture of rational cars?

ALBERT L. CLOUGH.

Standardization of Racing Machines.

Editor HORSELESS AGE:

Automobile racing has done much to develop and improve the automobile. The more one thinks this over the more obvious the fact becomes. As a protagonist of racing I want to see racing continued, but firmly believe that a new set of conditions will help matters all around. That a great deal of money has been wasted in building racing machines is very true, but at the same time large sums of money have been spent by manufacturers to very great advantage indeed. Money is going to be spent in racing and in building racing automobiles, and I am inclined to believe that there is a very general consensus of opinion among automobilists that if the racing automobile is standardized the amount of money sunk in racing every year will be greatly reduced, and the automobile business at large will be greatly benefited.

It is my opinion, and the opinion of many with whom I have talked, that a reasonable standardization of racing machines will give the designer a fine opportunity to show his skill; that racing as a sport will be greatly benefited; and most important of all the automobile will be developed along rational lines. We hope we have seen the end of the powerful engine, combined with the light frame. It is believed that the limit in this direction has been reached.

The writer of this letter is desirous of starting a discussion on this matter, and proposes herewith a tentative set of rules.

1. The weight of the racing vehicle complete shall not exceed 1,000 kilos. (2204.6 pounds).

2. If it be desired to divide racing vehicles into classes the classification shall be solely by weight. In all classes, however, there shall be a certain fixed ratio between the total volume of cylinder capacity and the weight of the complete car, assuming, of course, that the cylinders are single acting.

3. There shall be a certain ratio between the weight of the chassis and the weight of the complete racing vehicle. As racing machines are built at present the chassis and the racing vehicle ready for the road are practically one and the same thing.

The above has not been worked out

with any particular care, but it is hoped it may interest others in coming forward with opinions which will be of general interest. It is firmly believed that if racing machines continue to be built with no restriction beyond that of weight no good can result.

J. A. KINGMAN.

Battery Trouble—The Kansas "Burrlesque" Automobile Law.

Editor HORSELESS AGE:

The following experience may be of interest to your readers: One day last week I made a run of about 2 miles in my gasoline car to transact some business, which took about half an hour. After the business had been attended to I attempted to start the motor by turning the crank, but it would not go. I then examined the sparking plug, the coil and the interrupter, all of which appeared to be in good condition. After five or six trials the machine started and appeared to have its usual power, and I started for home.

After running about half a mile it began to slow down. I went into the slow speed and varied the mixture, but all to no purpose, and the car came to a full stop. After several trials the machine started again, and by short stages I managed to get it home and into my stable, feeling highly gratified that I did not have to be hauled home.

I examined the needle valve and the pipes connected therewith, and the carburetor, all of which I found all right. The next morning my machine started off all right, and I thought my troubles ended for the present at least. But I was doomed to disappointment, for I had the same experience before I got back home. I then called to my aid an expert on gasoline engines. He tried to locate the cause and run the auto, but with no better success than I had had, failing to locate the cause. He left saying "We must keep trying till we locate the trouble."

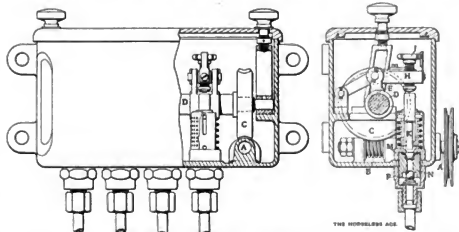
I then had the two batteries connected, but obtained no better results. At last I found the cause where I little expected to find it. A short time ago I had a new four cell battery put in. I took that out and obtained four new cells and put them in, and, lo and behold! the machine started off at the first turn of the crank, and has given me no trouble since. On testing the battery taken out we found one dead cell, and that caused all of my trouble by putting all of the other cells out of working order. After taking out the battery with the dead cell the four cell battery left in has taken on a new lease of life and runs the machine equally as well as the first battery, so I am sure that the dead cell caused all of my trouble.

I don't know of anything that will make a man so disgusted with an automobile as to have it refuse to go in a public place, where it most always happens. At such times when you try to locate the trouble you are sure to be surrounded by a score

of curious loafing men and boys, who persist in asking all manner of questions, and then when someone in the crowd sings out in a stentorian voice, "I should rather have a blind horse," it makes a fellow feel as though he would be glad to sell out mighty cheap.

I see you state in THE HORSELESS AGE of July 1 that an automobile law passed by the Kansas Legislature went into effect June 21. I beg to inform you that the Kansas automobile law was passed by the Legislature last winter and went into effect on April 1 last, and that there are no such requirements or penalties as described in THE HORSELESS AGE. On the contrary the Kansas law is one of the most liberal laws, and has less annoying provisions in it than any law in any other State I have read of. I think you have been wrongly informed in regard to it, so I herewith send you a copy of the law as published in the official State paper.

I have this to say in regard to the first section of the bill: It is to my mind one of



HAMELLE MECHANICAL LUBRICATOR.

the greatest burlesques perpetrated by any Legislature, and was intended for a take down of a politician who aspires to rule the State and Legislature politically, and direct all political appointments, both State and national, for Kansas, and who is represented as the chauffeur driving the "automobilious band wagon." All of this section is a curiosity.

S. L. LEAVITT.

[The full text of the law is published on another page of this issue.—Ed.]

The Moon's Influence on Cabs.

The moon exercises influence on the profits of a cab company—at any rate, in Paris. At the annual general meeting of the New Urban Cab Company, just held, the chairman complained bitterly of the effects of the wet weather on the profits of the company. He said: "In such weather as this nobody goes for the usual evening drive to the Bois de Boulogne. Happily, there is a change in the moon on the 25th, when we hope for an improvement in the weather."

...OUR... FOREIGN EXCHANGES



The Hamelle Mechanical Lubricator.

The illustration herewith shows a multiple feed mechanical lubricator for automobiles, manufactured by Henry Hamelle, 19 Quai de Valmy, Paris. This lubricator comprises a rectangular case, hermetically closed, which is filled with oil. Outside this case are disposed the feed connections and a grooved pulley, by means of which the mechanism is driven. The drive is effected by means of a catgut belt.

Each of the feeds of the device is supplied with oil by a separate pump M N K. The barrel N of the pump is fitted at its upper end with a pressed leather washer (shown in black) and at its lower end with a delivery valve. The part M serves simply as a guide for the plunger. This part is provided with two opposite vertical slots, in which works a cross pin fastened

in the plunger K. A little below these slots there are two holes through the wall of part M for the admission of the oil. The lower end of part M serves the purpose of holding the leather washer in place on part N, and also for securing the pump in place. The delivery valve box P serves also as a lock nut; its lower end is extended and threaded to receive a union coupling. The cross pin in the plunger K limits the travel of the latter. A coiled spring presses against this cross pin and holds the plunger in its uppermost position, in which position oil may freely enter the barrel of the pump. The part M is surrounded by a mantle of wire gauze which prevents foreign substances from getting into the pump barrel.

The shaft A, set in rotation by means of the grooved pulley, has fastened upon it an endless screw B, in mesh with a worm wheel C, keyed to the shaft D. This shaft is provided along its length with a number of eccentrics which transmit motion, through the intermediary of short connecting rods E, to as many levers H as the

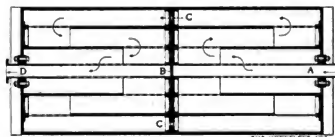


FIG. 1.

lubricator has pumps. Each of these levers carries a screw J with slotted head, the point of which at each turn of the shaft D presses down upon the corresponding piston. When this screw J is screwed down as far as possible the piston or plunger makes a full stroke; when the screw is unscrewed to the limit, the piston stroke, and the annular feed, are a minimum.

Where the shaft A leaves the case of the lubricator special provisions are made to prevent leakage. The bearing is counter-bored from the outside, the shaft is provided with a collar occupying a central position in this counterbore, a felt washer is placed on each side of the collar, and the washers are held in place by an oval flange bolted to the case.

A vent passage is provided in one corner of the case which ends under the cover through an opening covered with gauze.

The operation of the oiler is readily understood. When the plunger K is in its uppermost position the pump barrel N fills with oil through the openings in the walls of piece M. When the screw J strikes the plunger K the latter is forced down into the pump barrel K and in turn forces the oil in the pump barrel out beyond the delivery valve into the delivery tube. The return of the pump plunger is effected by means of the coiled spring. This lubricator is made in three sizes, with capacities of one, one and one-half and two parts of oil respectively.

European Mufflers.

American manufacturers of gasoline cars some years ago made advances in the reduction of noise of these cars that fairly startled European automobilists. Not a few mufflers have been exported to France from this country during the last few years, and instances have come to our notice where local French clubs delegated parties in this country to study the phenomenal noiselessness of certain American cars.

The Automobile Club of France, seeing that the general public was greatly opposed

to the extreme noisiness of some of their cars, instituted a muffler competition about a year ago, the results of which have already been published in *THE HORSELESS AGE* (February 4, 1903). Following are descriptions of the mufflers receiving awards, after a report in the *Automotor*:

The judges awarded 600 francs to Ossant Frères for their two mufflers, which appeared to be the most silent but absorbed 11 per cent. of the engine power. M. de Retz was awarded 100 francs for his muffler, which offers a little less back pressure, but is not quite so silent; and similar awards were made to M. Arnaud and MM. Linzeler & Cie. The muffler of M. Megevet received a mention, the judges considering that the noise it made was due mainly to



the sonorous metal of which it was constructed.

THE OSSANT MUFFLER.

The muffler of MM. Ossant Frères is of the cylindrical type, with a central tube A (Fig. 1), which is surrounded by three concentric tubes. All of the tubes are separated by a plate B, which has a number of perforations C C. The spent gases enter the silencer at A and pass from one chamber into the next, expanding in each one, and eventually escape at D into the atmosphere. Provision is made for an extension tube at D, which may be secured to the flange of the inner tube of this apparatus, in case further silencing is required.

THE DE RETZ MUFFLER.

In the De Retz silencer the exhaust gases enter by A into a drum, where they are split up into two currents. The bulk of these gases passes through the plates by the perforations B B B B, while a small

fraction of the gases passes into the central tube C through the holes D. From C this portion of the gas passes into the tubes E E and unites with the gases coming from the chambers F F. The object of completely expanding the gas in the central tube is to create a difference of density in the middle of the bulk of the burnt gases arriving by the holes in the annular walls of E E; in other words, it has the effect of a partial vacuum in the centre of the mass. The rapid movement thus set up causes a mixing and churning of the gases. Noise arising from this violent action is suppressed by the air cushions at G G. The gases then escape by the holes H H into thirteen chambers, which are created by as many longitudinal ribs on the periphery of each central tube. Ultimately the gases escape to the atmosphere by the holes in the outer shell.

THE RAVEL MUFFLER.

In Fig. 3 the Ravel muffler is shown in a sectional end and side elevation. The silencer is built up of three conic chambers, surmounted by a culasse. The gases enter the latter tangentially, by which means a strong circular current is set up in the outer chamber, and on arriving at

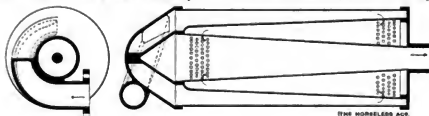


FIG. 3.

the bottom they pass through a number of holes into the second cone and ultimately through the central cone into the air.

THE ARNAUD MUFFLER.

This muffler is composed of three principal parts, consisting of two disks, which are kept at a distance from each other by another disk. On the outer edge of the disk is a ring, which is adjusted according to the volume of the exhaust. The gases enter by the upper tube and are pulverized, as it were, upon a central point. They pass through the narrow annular slit between the ring and the upper disk, and expand into the outer circular tube. Then they escape under the ring into the lower chamber, where they pass into the air through holes, the lower part of the chamber being so arranged that it can be opened to allow of a free passage of the exhaust. The gases are drawn through an annular aperture, and after expansion has taken place they are again drawn for final discharge in a regular and uniform stream. M. Arnaud received a special mention for his apparatus, which was considered to be compact, simple and easily detachable. It absorbed but a low percentage of power, but proved to be too noisy, which, in part, may have been due to the metal (bronze) employed in its construction.

The judges expressed their regret that

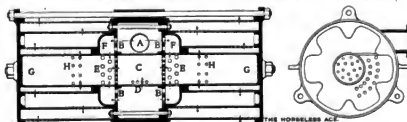


FIG. 2.

none of the silencers fulfilled the very necessary condition of suppressing noise without absorbing too much power. Those competitors who tried to break away from the conventional form of silencer, with more or less complicated systems of internal flanges and the like, have not altogether succeeded, though they are to be commended for their ingenuity and initiative. Thus, Chapay & Cie. entirely suppressed the noise by passing the exhaust gases through a porous substance; but the back pressure created was so great that considerable pressure was lost.

The principle underlying many of these systems is the breaking up of the successive discharges from the engine, so that the burnt gases will be churned up, as it were, into one mass, and then they are expanded, so that the exhaust leaves in an even volume. Unfortunately, a resistance is offered first by this churning up process and then by the passage of the gases through very small holes from one chamber into another, so that it is easy to understand why, in the words of the judges, "the loss of engine power increases in proportion to the diminution of noise." The ideal form of silencer, which will do away with the noise without creating excessive back pressure, has yet to be found.

AN ENGLISH MUFFLER.

Fig. 4 is an illustration of a simple muffler, the joint invention of L. W. Crosta and the Railway and General Engineering Company, Limited, of Nottingham, England, which consists of two header castings A and B and three concentric sheet metal tubes.

The exhaust products enter the casting A after they have just escaped from the working cylinder of the engine, and are cut up by the ribs C.C. The course of the gases is indicated by the arrows. Expansion of the gases takes place whenever they pass from one chamber into the next. Before they issue from the pipe D the gases are brought together in the central tube, and the sound waves are destroyed by the action of the gases, in the same way in which this takes place when the products of combustion escape from a bifurcated muffler.

Rules of the English Reliability Trials of 1903.

The A. C. G. B. I. will this year hold its annual reliability trial from September 4 to 12 inclusive, the route for each day starting and ending at the Crystal Palace, Sydenham, near London. The eight different routes represent a total distance of 1,014 miles; they are as follows:

Friday, September 4, to Folkestone and back, 139½ miles.
Saturday, September 5, to Eastbourne and back (Westerham Hill), 120 miles.
Monday, September 7, to Worthing and back (Bury Hill), 120 miles.
Tuesday, September 8, to Winchester and back, 133½ miles.

Wednesday, September 9, to Southsea and back (Hindhead), 144½ miles.

Thursday, September 10, to Bexhill and back, 121½ miles.

Friday, September 11, to Margate and back, 147½ miles.

Saturday, September 12, to Brighton and back (Hauddross), 87½ miles.

Following is a résumé of the rules which will govern this contest:

The trials are restricted to tourist cars (made in Great Britain or elsewhere), and no racing cars will be admitted. The number of cars of any particular type and horse power, entered by a manufacturer or agent, will be limited to one. There will be two general sections as follows:

Section 1. Motor vehicles entered by their manufacturers, by authorized agents or by private owners.

Section 2. Parts of motor vehicles (except tires) entered by their inventors, manufacturers or authorized agents, and showing a distinct advance on any similar apparatus previously used.

The entries in Section 1 will be divided into six classes according to price, the first class comprising cars selling under \$1,000 and the last class cars selling over \$4,500. The entrance fee varies for the different classes, being \$60 for the first class and \$150 for the last. Unless there

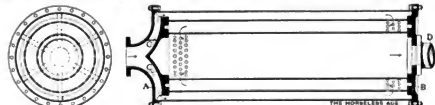


Fig. 4.

are in a class three vehicles of different types entered by three different firms, the class will be abolished and the vehicles will run in the next higher class. The entrance fee for any part (Section 2) is \$25.

In entering a vehicle a competitor must state the price at which he guarantees to deliver to the public exact duplicates of the vehicle or part entered for trial, provided the order be received before December 1, 1903, and be accompanied by a deposit of one-third the value.

Owners must state on the entry forms the bore and stroke and number of cylinders, and after the trial these measurements will be checked by the judges at a written request of the owner or of three competitors.

Entries at regular rates will be received up till noon on Saturday, July 11. After that date the entrance fees increase 25 per cent. per week, and the entry lists will be definitely closed at noon on Saturday, August 15. In the event of entry fees and other receipts being in excess of the expenditure, the surplus will be proportionally returned to those paying entry fees and returning their cars in the trial.

Every vehicle will carry an official observer. These will ride on a different vehicle every day and must not in any way

assist drivers, either by action or suggestion. In case of a vehicle carrying only two persons, the observer may, however, assist in repairing pneumatic tires. Each competitor must submit to the committee on or before August 8 the name of a suitable observer for each vehicle entered by him. The observer shall not act on the car of the competitor by whom he was found.

SPEED REGULATIONS.

To prevent excessive speeds vehicles will not be permitted to pass certain points before the expiration of certain periods from the time of passing a previous point, plus the total time occupied by stops. Each stage will be divided into sub-stages. The observers will inform drivers if they complete a sub-stage in less than the minimum time permitted them for that sub-stage; if the car arrives before time at the end of any sub-stage, after the third sub-stage of a stage, one mark will be deducted in respect of every minute of difference between the time occupied by the car from the beginning of the stage to the end of the sub-stage, and minimum time allowed for the same distance.

Vehicles arriving considerably before time may be disqualified. If a vehicle has to stop to prevent arriving early, such stops will be counted involuntary and penalized, and if a car loses more than ten marks in

a day from this cause, the entire record for that day will be lost. Detours made to avoid arriving too early will be counted as stops and penalized. In towns and villages the speed must not exceed 8 miles an hour.

PASSENGERS.

All motor vehicles must carry their full complement of passengers. If any of the passengers weigh under 11 stone or if any seats are unoccupied, the deficiency of absence must be made up by ballast. Passengers must be provided with comfortable seats and the cars must be fully painted and fully and permanently upholstered. Seats for certain portions of the journey may be placed at the disposal of the club, by giving notice to the secretary not later than August 24. The club will endeavor to provide that press representatives occupy such seats.

A vehicle must be driven by the same person throughout a day's run, unless he be incapacitated. Vehicles in Section 1 will only carry one acting mechanic in addition to the driver, and no other person shall take part in replenishing fuel, lubrication, adjustment and repairs, which must not be done when the car is under way.

AWARDS.

On the recommendation of the judges the committee of the club will give medals as

following: Section 1, gold and silver medals as first and second prizes in each class; Section 2, gold and silver medals. The judges may also award not more than three gold medals to vehicles which they may consider to possess specially meritorious features, such as simplicity, accessibility, etc.

METHOD OF MARKING.

There will be a maximum number of marks for reliability for each day's run, viz., 375, and one mark will be deducted for every minute during which the vehicle is at rest from the time of starting to the conclusion of the run, except for traffic, tire trouble, accidental detours, lighting carriage lamps, and the three compulsory stops per day for refreshments; viz., one-quarter hour in the morning; luncheon, three-quarter hour; tea, one-quarter hour, when the engine must be stopped, and the car may not be adjusted or replenished without losing marks. These stops may only be made at the specified places indicated in the program, and cars must not restart after the luncheon interval until the hour specified.

The cause as well as the duration of stops will be printed in the official report. There will also be deducted one mark for every minute in excess of the official maximum time for the run, the time occupied by all stops having first been added. The official maximum time will be the time which would be occupied by a vehicle in traversing the trial route at 10 miles per hour, plus the extra time occupied in controls and dangerous zones. Stops for punctures, traffic, or compulsory stops for refreshments are added to the maximum official time, but not represented by marks deducted. Five marks will be deducted from the marks for reliability for every stop for tire trouble.

ADJUSTING, CLEANING AND REPLENISHING.

There will be awarded 187½ marks each day, from which will be deducted one mark for every minute during which the car is being adjusted, cleaned, lubricated, or replenished at the Crystal Palace, or at the three-quarter hour compulsory stopping place. A vehicle will not be allowed to refill tanks or to oil up when under way.

At the end of the day's run the vehicles will be immediately driven into the storage building, from which everyone except the club officials will be rigidly excluded. The observer will be the last person to leave the car, and will see that the driver only turns off the fuel, lubricant, current and water, and does not interfere in any other way with the car without losing marks: the time occupied in such other things not to exceed twenty minutes. In the morning, when the observer has taken charge of the car, which shall not be before 6.45 a. m., the driver and mechanic will be admitted to the storage building, and the word will be given to start. The car may then be washed and replenished, and adjustments and repairs may be made, but one mark will be deducted in respect

of every minute during which the car is at rest for the purpose of such washing, replenishing, or repairs after the signal to start has been given. One minute will be allowed for actually starting the engine.

If at the end of the day's run the driver reports that he requires to make repairs or adjustments which will occupy more than twenty minutes, he shall drive his vehicle into a special storage building arranged for the purpose, and the observer shall report to the official in charge of the storage the time at which the repairs were commenced. The time occupied from that time until the driver or mechanic or both leave the storage building shall be considered as the time taken for the repairs.

Tires may be changed while in the storage building, and one mark will be deducted for every five minutes occupied in such work.

HILL CLIMBING.

The trials will comprise certain hills on which separate records from those of the day's run will be taken of the time occupied by the various vehicles in making the ascents. The marks awarded for the hill trials will be calculated as follows:

$$\frac{C}{\frac{\text{number of hills}}{(6 + \text{number of passengers})} \times (1,500 + \text{price in } £)}$$

× Average grade per cent. × speed in miles per hour. Full marks shall be 1,000.

The vehicles will not be stopped at the bottom of the hills. The number of passengers carried during the hill test must be the number carried during the other portions of the run. No alteration in the load during a hill trial will be allowed. If a passenger be dropped on a hill the car will lose all its marks for that hill.

BRAKES.

The judges will hold special tests on Thursday, September 3, and at other times, to ascertain whether the trial vehicles are fitted with sufficient brake power, and especially whether the brakes are so constructed that they will prevent the vehicle from running backward if stopped on a steep up gradient. Marks will be deducted from the total of 250 allotted if in the opinion of the judges the brakes are insufficient in design or material.

ACCURACY OF DECLARED HORSE POWER.

A total of 250 marks will be awarded to the car which is shown by actual performance on the hill to have given a horse power equal to or most nearly equal to the horse power at which it is described on the entry form. These marks will be arrived at by the following formula:

$$250 \times \left(\frac{140}{100} \times \frac{\text{H. P. performance}^3}{\text{H. P. declared}} \right);$$

the horse power performance being arrived at by the following formula:

$$\left(\frac{\text{Laden weight of car in lbs.} \times \text{vertical rise of hill in feet}}{\text{feet} \times 40 \text{ lb. per ton laden weight}} \right)$$

$$33,000 \times \text{time taken in ascending hill in minutes.}$$

The horse power performance shall be taken as the best performance of a car on any of the hills.

The consumption of fuel on all the cars will be taken for every day throughout the trials, and a total of 500 marks will be allotted under this head.

A speed trial will be held at Brighton on September 12, for which a total of 500 marks will be awarded, which will be arrived at by the following formula:

$$\frac{\text{Speed in miles per hour} \times (6 + \text{number of passengers})}{1,500 + \text{price of car in } £} \times C.$$

Seven marks will be awarded to vehicles for every 41 per cent. that the price on the entry form is below the maximum price in the class up to a maximum of 250 marks.

A total of 250 marks will be awarded for restarting on the hill on which the brake trials are carried out; each car will be required to traverse a measured distance of 15 yards in thirty seconds from a standing start. The time to be taken from the time at which the word is given to start; each car will be allowed three tries, and a third of the marks will be deducted for each failure. Running back, or lifting of the front wheels, shall not be considered to be a failure. Sprags may be used.

FINAL ARRANGEMENT OF MARKS.

In working out the marks for the various cars, the marks gained by the car which shows the highest number of marks under each formula will be raised or lowered by some constant to be arrived at later, so as to make the marks of that car coincide with the total number of marks allotted under the rules to each heading respectively, and the marks for the other cars will be varied by the same constant.

CERTIFICATES.

The club will give certificates to drivers of motor vehicles who may successfully and properly drive a vehicle throughout the trial, providing that the vehicle shall successfully accomplish the trial.

ARRANGEMENTS AT CRYSTAL PALACE.

All competing vehicles must be within the goods entrance under the South Tower at the Crystal Palace, Sydenham, on Tuesday morning, September 1, at 12 noon, otherwise they shall be disqualified. Cars may arrive at 12 noon on Monday, and are to be at once driven against their official number, which will be displayed on the wall of that part of the Crystal Palace reserved for the automobile club. The vehicle will then be marked by the judges. From that time no part must be replaced until after the judges have examined the vehicle after the trial, unless notice in writing of such change be delivered to the observer or to the secretary or his deputy within twelve hours of the change being made.

Duplicates of the competing vehicles may be displayed in the Crystal Palace during the period of the trials: a fee of 15 will be paid for each vehicle so displayed.

On running days the start from outside the Crystal Palace will not take place be-

fore 7:15 a. m. Vehicles will be started from outside the Crystal Palace at twenty seconds' interval in order of numbers, which will be secured by drawing lots for each day. The drawing of lots will take place at the Crystal Palace on Wednesday, September 2, at 12 noon.

If a vehicle does not start from a control, etc., when officially started, it will lose one mark per minute until it actually does start.

Spare tires or outer covers are not allowed to be carried in sight.

No vehicle or part shall bear a sign or other indication of the makers' name, except the small plates which are usually attached to the vehicles sold to private owners.

Every motor carriage shall bear a metal plate on the front and a plate at the back. Such plates each to measure 8 inches square, and to have painted on them the official number of the vehicle or part. These number plates, with numbers thereon, will be distributed at the automobile club's office in the Crystal Palace from Tuesday, September 1, 12 noon, to Wednesday, September 2, 10 p. m.

The firm of De Dion & Bouton is arranging a collective excursion of its customers through the east of France and the Rhine country. The trip will last about fourteen days. All expenses are, of course, to be borne by the tourists, while the organizers will arrange all details regarding hotel accommodation, storage, supply and public favor."

A special cable to a Chicago paper states that the French automobile industry is passing through another crisis: "Manufacturers find themselves with machines of tremendous development which are only worth so much old metal, and half the machinery is useless. It is certain, however, that the 'teuf-teuf' will soon again rise to public favor."

Trouble due to "low grade" or too heavy gasoline may generally be overcome by adjusting either the float valve or the height of the spray nozzle. The float, of course, sinks less deeply into the heavier liquid, and therefore maintains a lower level of gasoline in the float chamber. This can be remedied by either adjusting the float valve so that it closes for a higher position of the float, or by lowering the spray nozzle.

The following view of competition rules is propounded by Mervyn O'Gorman, a member of the A. C. G. B. I.: The three considerations which should be paramount in framing competition rules are: (1) That they shall not exclude any useful automobile; (2) that they shall not encourage any unsafe construction, and, as a consequence, (3) that the introduction of any disadvantage to the commercial automobile shall be a disadvantage in the race.

LESSONS OF THE ROAD

A Season's Use of a Steam Surrey.

By H. J. WILLARD.

It may be of some interest to readers of THE HORSELESS AGE to learn of some of the joys and sorrows the writer experienced with a steam s Surrey during the past year. The fever reached its climax in March, 1902, and the purchase of the machine, which had been contemplated for some time, was finally made and the car placed in service while the roads were still snow covered in places and the mud thick and deep.

After a lesson in firing up and operating, the s Surrey was turned over to its new owner and consigned to its fate. It was very fascinating from the first, but an unpleasant experience was met with the first time I attempted to take the family out on a ride, by running out of gasoline. I was, however, not altogether to blame for this, as the car had been represented to be good for about 60 miles with one filling of the fuel tank, and for from 30 to 40 miles with one filling of the water tank, and was turned over to me with the assurance that the fuel tank was "all right, have run it only a little around town and it must be nearly full now"; but it was empty before the car had run to miles. This was rather unfortunate, as it happened in front of the house, with many of the neighbors watching us to see something happen. On running up to the curb the car stood with two wheels a little lower than the other two and caused the gasoline to run to the lowest end of the tank. What little remained in the pipes was all burned while the passengers were getting ready and getting seated. Not knowing much about the machine, about everything that could be thought of was tried to get the fire started again, but it refused to burn with "hot air" alone, and, after the first collar had been wilted pumping up more air pressure, I discovered there was no gasoline vapor and concluded the tank must be empty.

The next experience was about two weeks later, when I became convinced the fuel tank did not hold enough for 60 miles and was not lasting 30 miles, the roads being in bad condition. This time the fuel gave out when we were about 4 miles out of the city. I got out of it rather easy, as it was only necessary to walk about one-quarter mile to a drug store, pay the price, carry the fuel back, fill the tank, pump up the pressure (with a large audience of the ever present small boy), and listen patiently to remarks by my wife of the possibilities if I had only invested half as much in a good old fashioned horse. This was the last time that 60 mile tank was trusted, and an extra 5 gallon tank full of fuel was carried on the dash.

The water tank also had shown a dispo-

sition to get dry often, but as it was handy to fill it after making short runs, this did not cause any serious trouble until I attempted to get out into the country. After the true mileage capacity was learned no more trouble was experienced from that source. The car ran very satisfactorily around the city and I was very well satisfied, although often reminded of the possibilities of that "old horse," and enjoyed it very much.

The first run into the country (after May flowers) was made in April, on a very windy day. We expected to find the frost all out of the ground and the roads in fair condition, but found where the road ran close to the north side of a heavy growth of wood it was still in very bad condition. Two or three bad spots were passed without trouble, and the last one in sight looked a little worse than the others, especially in the ruts; but the middle of the road looked fair and one side appeared all right, as the leaves and grass were dry. By the time we were fairly into it the wheels at the side of the road had sunk into the soft clay up to the hubs, but the wheels in the middle of the road did not sink in much. The power proved not strong enough to carry us through, and then I was greeted with "I knew something would happen," coming from the back seat. Only little progress could be made by alternately backing and going ahead, as the driving wheels would slip every time they came to the end of the old track. It was necessary to assure the occupants of the rear seat that we would come out all right, and after every failure they insisted on getting out and lifting the entire 1,100 pounds out of the mud. I finally made the mistake of my life by saying it was better to sit still, as all that was necessary was to have weight enough in the rear to prevent the driving wheels from slipping. This caused Mrs. W. to lean over the side and see for herself if the wheels held all right when she sat still, but they slipped again and just as her face was in line with one of them.

That settled it, and she was going to get out and walk—and she meant it, too—so I got down humbly into the mud, ankle deep, and lifted all three over the soft mud to a dry spot at the side of the road. Help arrived about this time, and with a little pushing we got the car out all right, the passengers were finally induced to get aboard, and off we went again.

We got our May flowers and had a very pleasant ride without any more trouble of any kind, but did learn a little about the capacity of the water tank. It was found necessary to hunt up a pump or dip water from some stream or brook every 12 to 15 miles, as no steam lift had been provided. Several trips were made into the country without trouble of any kind, excepting some tire troubles, which were to be expected with single tube 2½ inch tires carrying a load of about 1,600 pounds.

About the time the roads had got in good

condition, and the season was fairly on, I was obliged to go to New York, and after being there about two weeks I could not stand it any longer, seeing so many enjoying what was to me the greatest pleasure I had experienced for many years, and the survey was soon on its way there.

The change from poor dirt roads to the finest asphalt added to the pleasures already derived, and the survey appeared to have got where it was at its best and had all the power required for good roads.

While running on the asphalt no trouble of any kind was experienced, and even the single tube tires were all right, but the stone roads in and around Orange, N. J., were too much for them, and they gave more trouble than they ever had before. Nevertheless many evenings were spent riding around the city and there was absolutely nothing in the way of repairs or adjusting from the time it was fired up and run out till it was put up for the night.

The most unpleasant experience the writer has had was while the machine was in Orange, and happened early one Sunday morning. The car had been in use so late Saturday night that the station where it was kept would have been closed some hours, so it was run into the yard and covered up for the rest of the night. The next morning I was obliged to be in New York early, to attend to some business, and as it had begun to rain hard the machine was fired up and a start made for the station, about one mile away, in a pouring rain. When about half way there, and on a steep hill, the boiler began to "blow itself" into the tank, through some of the checks either stuck up or having dirt under them, and as it was nearly train time a great effort was made to make the hill before stopping; but as the water began to lower very fast I backed into the side of the road, got out and shut off the fire, and found it was just too late, as the burner had already begun to spitter, on account of water coming through the bottom of the boiler. Being so short of time, it was decided to give it up and submit to the humiliation of being towed in, which, by the way, was the first and last time to date.

This experience furnished a subject for reflection that kept me thoughtful the rest of the day and was partly the cause for making changes that have since proven a source of great comfort to me and taught me a lesson that I hope will last. I first bought a new boiler that would not burn out if the water got low or all out, made a condenser, enclosed the engine, made a multiple lubricator for the engine with a 2 quart tank, and put the hand pump at the driver's right hand and connected it in such a way that the driver could tell by the hand pump if the pump on the engine was working right. The new boiler and condenser were put on to try an experiment that did not turn out entirely satisfactory at the time. The idea was to use in place of the water some liquid that would evaporate at a low temperature, wood alcohol being the one

chosen, but the engine lost so much around the rods and stems, in addition to the loss from not being able to condense all the vapor in hot weather, that the experiment was not carried to any practical conclusion. It appeared necessary to have an engine and pump entirely enclosed and connected to the condenser to catch all waste at the engine, as that was continuous and constituted the greatest waste.

The lesson, which I hope we well learned, is that it doesn't pay to try to improve on what is well enough, and it is best to get all the use and pleasure possible out of your machine just as the builder made it, and if it doesn't suit you find one that you like better.

Although the survey is a better machine in several ways than it ever was before, I would not do the same work again, as it took all my spare time for nearly two months, when I should have been enjoying the use of it. During periods of cold weather last winter I proved to my own satisfaction that 25 per cent. of wood alcohol in the water will prevent it from freezing and the addition of alcohol adds to the steaming capacity. One other improvement consisted in putting in a 14 gallon fuel tank in place of the 6½ gallon tank, which, with the condenser, allows making long runs.

I have now decided to own a gasoline machine next, and if I wished to use it in cold weather the alcohol solution would be the first thing I should try to prevent freezing, although it would evaporate fast and would require being renewed oftener than other anti-freeze solutions.

My advice to anyone disposed to own a machine is to get it by all means, and not wait for perfection, as nothing is perfect in this world and the machines of today are probably nearer perfection than most of us. There is so much pleasure to be got with an automobile, even though there are some troubles in store for most of us, that it makes up for all of them many times over.

Gordon Bennett Notes.

Edge had no less than seven tire bursts, and his bad showing was almost entirely due to this.

At Athy the drivers were being attended by friends at the control with cold tea. Edge met with a great ovation every time he passed, and Gabriel was the next favorite with the multitude of country people. Jenatny was by far the most picturesque figure as he dashed past with rigid features. A sensation was caused at this control by Mooers rushing through for the first time at top speed, and failing to stop, despite the signals given to him.

On arriving for the third time at Stradbally De Knyff had a gasoline can thrown by a French mechanic in attendance to the chauffeur, who missed catching it, and the corner of the can hit the gasoline tank of the car, knocking a small hole in it, which De Knyff at once stuffed with an

oil rag, and he apparently suffered no ill results.

This was the first Gordon Bennett race in which the English rule of the road was followed; it will be seen from our illustrations that all the drivers kept to the left.

When Gabriel's car was standing at the start each wheel was closely watched over by a mechanic, evidently with a view to avoid any treachery on the part of rivals.

Mooers, as one of our illustrations shows, had the fore part of his car covered with a thin gauze. This an American, humorously inclined, explained as intended to show that there were no flies on it.

Jenatny and Keene were generally conceded to be the most daring of the drivers, and one of the London dailies states that Keene holds the world's record for number of joints dislocated in his sportsman's career.

The committee in charge of the Gordon Bennett race was composed as follows: Duke of Ratibor, Baron de Zuylen, Roger W. Wallace, Albert R. Shattuck, Colonel Crompton, W. Worby Beaumont and W. W. D. Goff, judges; Major F. Lindsay Lloyd, starter; R. E. Phillips, chief timer; Basil Joy, J. D. Siddeley and J. S. Mallam, assistant timekeepers.

A very elaborate "official guide" was issued for the automobile fortnight in Ireland. It was well patronized by advertisers, and in some of the ads the proverbial Irish wit is reflected. One ad. is in the form of a telegram addressed to "Motorists," and reads: "Fear foreigners are using the wrong 'mixture.' —'s Dublin Smoking Mixture is the right thing."

It is of some interest to make a comparison between the machines with which Alexander Winton entered the Gordon Bennett cup race in 1900 and in 1903. The first weighed about 2,000 pounds and had a single horizontal cylinder of 6½ inches bore and 6¾ inches stroke. The latter machine weighs 2,150 pounds; it has eight horizontal cylinders of 5 inches bore and 6 inches stroke—nearly four times the cylinder capacity of the earlier machine.

Trade Literature Received.

The Automatic Lubricator Company, Chicago.—Simplex and Multiplex Mechanical oils.

Columbia Engineering Works, Inc., William and Inley streets, Brooklyn, N. Y.—Catalogue of the Herschmann steam trucks.

The Continental Caoutchouc Company, of New York, 208 Broadway, New York city.—Price list of the "Continental" pneumatic tires.

Howard Automobile Company, 67 and 69 Dock street, Yonkers, N. Y.—Catalogue of the Howard hydrocarbon runabouts and tomcats.

Wheeler Manufacturing Company, to 166 Baltimore avenue West, Detroit, Mich.—"Automobile specialties" (dos-a-dos seats, hampers, trimmings, special reel work).

NEW VEHICLES AND PARTS.

The Mason Steam Engine, Model "C."

The Mason Regulator Company, of Boston, Mass., are marketing a new automobile engine, of which the following is a specification:

The two most important changes made are the increase in the dimensions of the parts and in the wearing surfaces. The latter are all case hardened to increase the life of these surfaces, as well as the life of the engine itself. The makers claim that it has no delicate parts or intricate devices and that it is designed to be readily understood by an amateur operator. The cylinders of this engine have a bore of 2 3/4 inches, a stroke of 3 1/2 inches and are equipped with double acting pistons. With a boiler pressure of 200 pounds per square inch this engine will develop 7 1/2 horse power.

The frame of the Model "C" engine is cast of a special phosphor bronze metal. The main crank shaft bearings are composed of two hardened steel cups screwed into clamping rings of brass. These rings are securely held in place by caps provided for the purpose. Each of the ball cups has thirty notches on its outer circumference, and locking plates of the conventional type are employed to keep the cups from coming loose. The main bearing bolts secure the locking plates in such a way as to insure against the cups and plates working loose.

The crank shaft is of the built up type, i. e., the crank and eccentrics are forced on and keyed to the shaft with tool steel keys. A special high grade cylinder iron, it is claimed, enters into the cylinders, which are provided with very small clearance spaces to reduce steam consumption. Copper gaskets are used exclusively in packing the joints. The pistons are fitted with a double set of rings, which are held in place by bull rings, and the piston rods and slide valve stems are made of Tobin bronze of high tensile strength. The cross-heads, which are of the ball bearing type, are tapped to admit the piston rods, while the crosshead slides are of the grooved type with wedge adjustment. These wedges are operated by set screws and are securely held in place by means of bolts having jam nuts and split pins.

The connecting rods of this engine are drop forged and have case hardened bearing cups. The method employed to secure the cups and locking plates is identical with the one described above in connection with the main bearings. The wrist pins are made of steel and are case hardened and ground so as to present conical bearing surfaces. Provision is made for lubrication and adjustment. The boiler feed pump has a plunger of five-eighth inch diameter and a stroke of thirteen-sixteenths inch.

All the engines of this model are

equipped with twelve tooth sprockets for one inch by three eighth inch roller chains, unless a different sprocket is specified.

A departure from former practice has been made in the method for securing the sprocket, which is now locked by means of a right and left hand thread. Hair felt is used to pack the cylinders with, and Russian iron forms the jackets, which are trimmed with brass.

The Remington Gasoline Tonneau.

The Remington tonneau touring car, the new product of the Remington Motor Vehicle Company, of Utica, N. Y., is of the French type, with motor in front under a bonnet.

The wheel base is 6 feet 4 inches and the tread is standard. The wheels, of the artillery pattern, are equipped with ball bearings in front. The "live" rear axle shafts revolve in Hyatt roller bearings, these shafts being located in tubes which comprise the well proper. On both sides of the differential is a spider, which is brazed to its respective tube. These spiders are bolted together by means of staybolts. To brace the rear axle structure two trusses are run under the cage formed by the spiders and bolts.

The compensating gear is of the spur variety and is driven by means of a roller chain.

The reachless running gear is fitted with four full elliptic springs about 36 inches long. Distance rods are provided to keep the rear axle in its proper position and to permit the slack in the chain to be taken up. The frame, which is built up entirely out of 1 3/4 inch angles, has six crosspieces.

The to horse power motor, running at a normal speed of 800 revolutions per minute, is of the two cycle type and has two vertical cylinders of 4 inch bore and 5 inch stroke.

Ignition is by jump spark and dry cells, of which two sets of five large cells each are used. Lubrication is by means of a sight feed oiler mounted on the dash, while the radiator is of the bent flanged coil pattern, with eighteen rows of tubes and a gear pump to circulate the water.

The transmission gear affords three forward speeds and a reverse, all controlled by a single lever centrally located with respect to the front seat. The main clutch, of the expanding ring type, engages the engine flywheel. On a smooth road it is said to be possible to start on the high gear. At the normal rate of engine speed this gear will drive the machine at the rate of 20 miles an hour. The control devices comprise a linged steering wheel, a spark and a throttle lever on the steering column, a brake pedal, a speed change controlling lever and a pair of pedals for throwing the clutch in or out.

The body has divided front seats and a roomy tonneau, which has an additional seat in the gate. The seats are upholstered in tufted leather.

Club Notes.



A. C. OF SALT LAKE CITY.

An automobile club, with twenty members, has been organized in Salt Lake City, Utah. J. D. Kendall has been elected temporary president and C. S. Wilkes secretary. The club has already gone on record as against racing wherever conducted.

A. C. OF KANSAS CITY.

The Automobile Club of Kansas City, Mo., has elected new officers as follows: William Huttig, president; Harry Loose, first vice president; Dr. G. L. Henderson, second vice president; Myron C. Albertson, secretary; Henry C. Merrill, treasurer; Roy Sanborn, captain; A. C. Griffith, lieutenant, and J. N. Penrod, E. P. Moriarty, C. F. Lovejoy, H. T. Blakeley, T. W. Day and Louis Curtis directors. Arrangements have been made for the entertainment of the Interstate Automobile Club in October.

GRANITE STATE A. C.

The Granite State Automobile Club, of Manchester, N. H., has just been organized with a membership of thirty. The officers are: Walter M. Parker, president; Albert L. Clough, secretary-treasurer; Harry E. Loveren, Fred W. Fisher, Charles E. Green, A. E. Dumas and William J. Hoyt directors.

A. M. L.

The American Motor League has under way an energetic recruiting plan by which it hopes to largely increase its membership by January next. It is also preparing to issue road books and lists of official hotels and repair shops, under a plan of organization similar to that formerly used by the League of American Wheelmen. The policy of the league is announced as one of "promoting the legitimate use of the automobile," and it is out with resolutions severely condemning all speed contests on public highways.

New Incorporations.

The National Capital Automobile Company, of Washington, D. C., was incorporated July 3 by Henry L. Wheatley, James K. Polk and Freeman Field.

The Motor Vehicle Company, of Jefferson County, has been incorporated under the Kentucky laws. The incorporators are R. W. Otter, J. Kemp Goodlow and E. B. Ayers. Capital, \$10,000.

United States Consul D. R. Birch, of Malaga, Spain, writes that owing to the recent arrival there of an automobile from France, he has been approached by a number of prominent men in that city with regard to American automobiles. If American manufacturers will send him catalogues and price lists he offers to see to it that they are advantageously distributed.



CAMPING IN THE DESERT.

Across the Sierra Nevada.

In our issue of June 24 we made mention of the start from San Francisco of E. T. Feitch and M. C. Krarup in a Packard 12 horse power car, with the purpose of making a trip across the continent to New York. Following is a brief description of the first part of the trip, based upon information furnished us by the Packard Motor Car Company, the manufacturers of the car:

The start was made from the garage of Harold W. Larzalere, the Packard Company's Pacific Coast agent, 1814 Market street, at 5 o'clock p. m., on Saturday, June 20. When the Oakland ferry was reached the cyclometer registered 68 miles, which represented the amount of road testing the machine had received after leaving the assembling rooms. During the first evening the car was run from Oakland to Porta Costa, a distance of 38 miles, covered between 6 and 8 o'clock. No stops were made, except for frightened horses, but the bronzed bushed crank pin bearing was noticed to run rather hot. The cause, discovered the following morning, was that the point of the lubricating needle valve had been broken off and the packing of the valve had got in under the broken point. The needle valve was filed to its proper shape and the bearing worked itself into order during the second day's drive.

After ferrying across the strait, between Porta Costa and Benicia, at 9 o'clock a. m. travel was resumed toward Sacramento, the capital of California, which was

reached after 8 o'clock in the evening, the cyclometer registering 215 miles, or 109 miles on that day. The car passed through Benicia, Cordelia, Suisun, Fairfield, Vacaville (where lunch was taken), Dixon, Davisville and Woodland, going in all 46 miles out of the planned route, partly to avoid a district adjacent to the Sacramento River, where floods in the spring had destroyed the bridges, and partly to recover a satchel which was lost out of the car between Vacaville and Dixon.

The crank pin bearing remained somewhat heated most of the day, but the loss of power was not sufficient to seriously reduce the speed on smooth roads or stall the car on sandy hills. Many of the roads had been treated with crude oil recently and afforded pleasant traveling, but some were extremely dusty.

The copper drip trough by which lubricating oil is fed to the groove in the connection rod got loose a few miles out of Fairfield, and was readjusted with copper wire in about fifteen minutes.

It was 9:10 o'clock when the car was started the next morning. When barely out of town a restive team had to be led by the machine. The next 6 miles, to Smith's Flat, a stretch not kept in repair by the State, was very rough and stony. At Smith's Flat an altitude of 2,710 feet had been reached, or a rise of 880 feet above Placerville. The car arrived at this place at 10 o'clock, having run a great part of the distance on the intermediate gear. For 8 miles farther it was up hill; the route led through a mining country,



ON A DESERT ROAD.

and numerous flumes were passed, some of which carried timber floats to the saw mills. When the State road was reached the surface became good, but the road was extremely narrow for passing teams comfortably.

After the 14th mile, past the Pacific House, reputed to be one of the most select road houses in the United States, and along the picturesque Bullion Bend to Riverton, the rise in altitude was slight, and there was no appreciable rise for another 12 miles. A stop for dinner was made at Riverton, when the motor was found to be still rather hot. It was then discovered that a special device, put on to enable the operator to regulate cylinder lubrication from the seat, turned the oil nearly off when it was supposed to allow a full flow. The only apparent result so far of the dearth of oil had been an unusual consumption of cooling water. The lubrication regulator was differently adjusted, and the result was at once noticeable in greater hill climbing power of the car.

At Riverton the only stone bridge built by the State of California was crossed, to the north side of the river, and from there the car continued 12 miles to Kyburz's Hotel and Sugar Loaf, rising all the while, until at 5:05 o'clock at Sugar Loaf an altitude of 4,100 feet was reached. Here the tourists put up for the night.

On Wednesday travel was resumed bright and early, at 5 o'clock, the thermometer showing 52° and the cyclometer 304 miles. At 6 o'clock the barometer



A MOUNTAIN FOREST.



DANGEROUS TURN AND STEEP DESCENT.



A FRIGHTENED MULE TEAM.



ROUGH AND RUGGED COUNTRY.

showed a rise of 1,180 feet. The official elevation of the Government Forest Ranger's office, near Watson's Hotel, is 5,280 feet. At this hotel breakfast was taken at leisure and a fresh start made at 8:20. At 8:40 Slippery Ford was reached. The ford is bridged, but on the opposite side rises a long sandy and sinuous grade of 15 per cent. Half way up, at an elevation of 1,558 feet, stops were made to let a four horse stage and team and wagon pass. At 10:07 the summit was reached, the altitude of which is 7,300 feet. It was calculated that during the last portion of the climb an elevation of 1,800 feet had been overcome in one hour's running.

When the trip was commenced special provisions were made to reduce the compression space at high altitudes by inserting shims under the connecting rod, to make up for the rarefaction of the atmosphere. This expedient was not employed, however, and nothing was done to the motor except that the auxiliary air inlet was fully opened. The entire climb from 5 o'clock till 10:07 was 3,080 feet, and the distance covered 18 $\frac{1}{4}$ miles, making an average grade of a little more than 3 per cent.

From the summit a serpentine road leads down the precipitous east side of the Sierras to the Lake Valley, descending 805 feet in 2 miles. The footing on this road seemed good, and it was decided to make

a drop record if possible. The start from the summit was made at 10:35 o'clock and the bottom reached at 10:44 $\frac{1}{2}$ o'clock. At the completion of the descent the brake, which has a bronze and cast iron friction surface, sizzled when spat upon.

The drive across the sandy Lake Valley to Meyer's Station and Lake Side Hotel was uneventful. The northeastern exposure of the adjacent mountains, especially Mt. Tallac, 9,770 feet, was covered with snow. After dinner at Lake Side Hotel the journey was resumed at 2:20 p. m., and then came by far the most difficult climb of the day. A hill 1 mile long, of 10 to 12 per cent, with stones and boulders projecting in the track, led upward to the summit on the Nevada side of Lake Tahoe, from 6,250 feet elevation to 7,300 feet. The temperature was 82° Fahr., and little air was stirring. The rise of 1,000 feet was made in one hour and ten minutes, practically all on the low gear.

The descent to the Carson Valley proved almost a sheer drop of 2,400 feet, on a direct distance of not more than 2 miles, but the actual distance of the route around the mountain measures 6 miles, and contains grades as steep as 17 per cent. according to the gradometer. Twice short halts were made to inspect and cool the brakes, and half way down a turn revealed an exceedingly picturesque spring with a trough. The start down was made at 4:10 o'clock and the bottom reached at 4:47, the

barometer having risen from 23.05 to 25.2 inches.

The next 20 miles, from the foot of the Kingsburg grade to Carson City, led through a valley over mostly fair roads, and at 6:10 p. m. Carson City was reached, this being the first time that an automobile had been seen at that place. About 6 gallons of gasoline had been consumed during the day's run. Next morning the trip was continued to Reno, 35 miles, the start being made at 7 o'clock and the destination reached at 9:35.

Endurance Run Preparations.

Because of the extreme difficulty of so arranging each day's run that hotel and other accommodations can be obtained, the original course proposed for the endurance run promoted by the N. A. A. M. has been abandoned. On Monday morning Harry Unwin, secretary of the association, started on an exploration tour. He will go via Kingston to Corning. By the time he reaches that point it will have been decided whether he shall proceed via Buffalo and Erie to Cleveland, or via Jamestown and Franklin to Pittsburg. It is intended to hold hill climbing contests and a two days' race meeting at the close of the run, and the decision as to the finishing point will depend somewhat on the facilities available for these features of the event.



A MOUNTAIN STREAM.



THE HORSE A BIG BOTHER TO THE TOURISTS.



THE PEERLESS IN THE ELYRIA RACE.

Elyria Race.

On July 4 the Cleveland Automobile Club made a run to Elyria, Ohio, on the invitation of the automobile club of the latter city to participate in the race and other festivities. The run was made by a large delegation of Clevelanders and the trip was an enjoyable one. At Elyria the local club welcomed the visitors and served a tempting luncheon. After a parade around the city the crowd adjourned to the race track on the fair grounds, where preparations had been made for automobile races.

The principal event of the day was a 10 mile open contest in which two Peerless and two Winton cars participated. The Peerless cars were driven by Louis De Raugo and Ed Parsh, while the Winton cars were driven by Harry Tumie and Leo Melanowski, superintendent of the Winton factory. The race was exciting from the start, but soon narrowed down to a contest between the two Peerless cars, we are informed, as both Wintons dropped out. The race was finally won by Louis De Raugo in 18m. 56 $\frac{1}{2}$ s.

The Pittsburg Races.

The first race organized by the Automobile Club of Pittsburg took place on Saturday last, July 11, on the Beechwood Boulevard in Highland Park.



THE START IN THE PITTSBURG RACES.

The course was just 1 mile long and ran up a grade of about 2 per cent. No records were broken. Several machines

with a record of 2:02. They got an even start and kept wheel with wheel, neither seeming to have an advantage. From the vociferous applause along the course as the contestants passed it was inferred by those near the finish line that it would be a close finish, and it was, Guffey's car crossing the line not 2 feet ahead of the Autocar in 2:10 1-5.

In Class "G" there seemed to be some confusion about the final, and E. H. Belden's Winton was run with George H. Flinn's Mercedes, the latter winning in 1:18. It was then decided to allow A. L. Banker's Peerless to run with the Mercedes. The time of the former was 1:18 1-5; of the Mercedes, 1:17 2-5, a difference of four-fifths of a second, although the Peerless had beaten the Mercedes two-fifths of a second in the earlier heat.

Another interesting event was the running of the Waverley electric racer, which



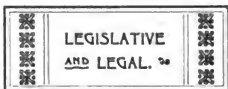
AT THE FINISH.

made the mile in 1:20 2-5. It seemed to fly along.

Taking the contest through and through, it was a decided success from a sporting standpoint; but in all racing contests some classification must be made that will be more fair to regular machines which have no chance with professional and private racing machines. Of course, the racer is the machine for speed contests; but it

should not compete with the pleasure car, no matter what its weight or horse power. For the present it seems impossible to properly classify the cars in a manner fair to all, but I believe that a racing scheme will soon be devised fair to all cars.

The weather was fine and about 12,000 people witnessed the first speed races run by automobiles in Pittsburg. The results were as follows:



The Kansas State Law.

(Senate Bill No. 223.)

Section 1. That the term automobile and motor vehicle as used in this act shall be construed to include all types and grades of motor vehicles propelled by electricity, steam, gasoline or other source of energy, commonly known as automobiles, motor vehicles, or horseless carriages, using the public highways and not running on rails or tracks. Nothing in this section shall be construed as in any way preventing, obstructing, impeding, embarrassing, or in any other manner or form infringing upon the prerogative of any political chauffeur to run an automobiles band wagon at any rate he sees fit compatible with the safety of the occupants thereof; provided, however, that not less than ten or more than twenty ropes be allowed at all times to trail behind this vehicle when in motion in order to permit those who have been so fortunate as to escape with their political lives an opportunity to be dragged to death; and provided further, that whenever a mangled and bleeding political corpse implores for mercy, the driver of the vehicle shall in accordance with the provisions of this bill "Throw out the Life Line."

Sec. 2. That this act shall in no case change or repeal in any particular the present laws relating to the operation and management of steam traction engines of any kind along the public highways, neither shall the present laws in relation to the management of steam traction engines have any application as to the management and use of automobiles or motor vehicles along the public highways of this State.

Sec. 3. Every automobile or motor vehicle shall be provided with a suitable bell, horn or other signal, and be equipped with good and efficient brakes. Every automobile or similar motor vehicle shall be so constructed as to exhibit during the period from one hour after sunset to one hour before sunrise, one or more lamps showing white lights visible within a reasonable distance in the direction toward which the automobile is proceeding. The lamp or lamps shall be so placed as to be free from obstruction to light from other parts of said automobile or motor vehicle.

Sec. 4. No person driving or in charge of an automobile or motor vehicle on any street, avenue, parkway or driveway or public highway in this State, shall drive or operate the same at any speed at any time greater than is reasonable and proper, having due regard to the traffic and use of the highway, or so as to endanger the life or limb of any person.

Sec. 5. No automobile or other motor

CLASS A—MOTOR CYCLES.

Owner and Make.	H. P.	Time.
Harry Mashey (Orient buckboard).....	3	1:33
Fred Baker (Orient buckboard).....	3	1:57 2-5

EXHIBITION.

A. L. Banker, Douschet.....	16	1:24 3-5
Orient first, Orient second.		

CLASS B—ELECTRICS UNDER 1,500 POUNDS.

J. H. Lindsay (Centaur).....	2½	2:01 2-5
L. G. Martin (Columbia).....	2½	2:03 1-5
A. L. Banker (Waverley).....	3	2:29 2-5

The finals between Lindsay and Martin not run off, as both vehicles broke down.

CLASS B1—ELECTRICS OVER 1,500 POUNDS.

W. N. Murray (Studebaker).....	4½	2:06 2-5
J. J. Burke (Columbia).....	5	2:35 2-5
L. E. Reineman (Waverley).....	3	3:00 1-5
J. F. Burke (Columbia).....	5	3:02 2-5
W. C. Temple (Waverley).....	3	4:11 1-5

Murray's entry won in finals against J. J. Burke. Time, 2:14.

CLASS C—STEAM MACHINES UNDER 1,200 POUNDS.

W. H. Artzberger (Artzberger).....	6	1:42
Reuben Miller, Jr. (Stanley).....	4	1:46
S. F. Hammond (Conrad).....	4	1:59

Artzberger won in finals with Mr. Miller's entry. Time, 1:41 1-5.

CLASS D—STEAM CARS OVER 1,200 POUNDS.

W. Artzberger (Foster).....	6	1:33
J. H. Lindsay (White).....	10	1:45
Peter Hermes (White).....	10	2:20 1-5
W. P. McVay (White).....	6	2:45

Mr. Lindsay's car won from Mr. Artzberger's in finals. Time, 1:40 3-5.

CLASS E—GASOLINE CARS UNDER 1,000 POUNDS.

A. L. Banker (Olds).....	4	1:39
W. N. Murray (Franklin).....	10	2:16
J. H. W. Myers (Northern).....	5	2:27
F. T. F. Lovejoy (Pierce).....	6½	2:37
H. M. Laughlin (Penna. Electrical and Supply Co.).....	4½	2:49

Mr. Banker's car won in finals with Mr. Murray's. Time, 1:51 4-5.

CLASS F—GASOLINE CARS BETWEEN 1,000 AND 1,500 POUNDS.

T. H. Guffey (Decauville).....	10	1:50 1-5
Dr. Geo. Urling (Autocar).....	10	2:02
Clarence Fleming (Autocar).....	10	2:06 2-5

Mr. Guffey's car beat Dr. Urling's. Time, 2:10 1-5.

CLASS G—GASOLINE CARS BETWEEN 1,500 AND 2,000 POUNDS.

A. L. Banker (Peerless).....	32	1:15 3-5
G. H. Fliinn (Mercedes).....	18	1:16 1-5
E. H. Belden (Winton).....	20	1:36 1-5
George E. Turner (Peerless).....	16	1:37 3-5
C. P. Matheson (Peerless).....	16	1:49 1-5
F. A. McCune (Darracq).....	12	1:52 3-5
Harvey Miller (Peerless).....	16	1:57

CLASS H—GASOLINE CARS OVER 2,000 POUNDS.

Ralph Clemson (Winton).....	16	1:40
A. R. Neeb (Peerless).....	16	1:41 2-5
William Graff (Peerless).....	16	1:43 1-5

Mr. Neeb's car won in the finals against Mr. Clemson's. Time, 1:37 3-5.

CLASS I—FREE FOR ALL.

A. L. Banker (Peerless).....	32	1:18 1-5
Banker Brothers (Waverley).....	5	1:20 2-5
Pittsburg Automobile Company (Georges Richard).....	24	1:29 3-5
White Sewing Machine (White).....	10	1:32 3-5

A. L. Banker's Peerless racer won against the Banker Brothers' Waverley electric racer in the finals. Time, 1:17.

vehicle shall be run on any public highway outside the limits of the thickly settled or business part of any city or town at a speed exceeding 20 miles an hour, and no such vehicle shall be run on any public street or highway within the thickly settled or business part of any city or town at a speed exceeding 10 miles an hour.

Sec. 6. Every person having control or charge of a motor vehicle or automobile shall, whenever upon any public street or highway and approaching any vehicle drawn by a horse or horses or any horse upon which any person is riding or driving domestic animals, operate, manage and control such motor vehicle or automobile in such manner as to exercise every reasonable precaution to prevent the frightening of any such horse or horses or domestic animals and to insure the safety and protection of any person riding or driving the same. And if such horse or horses or domestic animals appear restive and frightened, the person in control of such motor vehicle shall reduce the speed thereof, and if practicable turn to the right and give the road, and, if requested by signal or otherwise by the driver of such horse or horses or domestic animals, shall proceed no farther toward such animal or animals, but remain stationary so long as may be necessary to allow such horses or domestic animals to pass. This provision shall apply to automobiles or motor vehicles going either in the same or in the opposite direction.

Sec. 7. Upon approaching a crossing or intersecting ways, and also in traversing the crossing or intersection, the person in control of any automobile or motor vehicle shall run at a rate of speed less than that above specified, and not greater than is reasonable and proper, having regard to the traffic and the use of the intersecting ways.

Sec. 8. The cities of the first, second and third class of this State shall have power by local ordinance to regulate and control the use and speed of automobiles and motor vehicles within the limits of said cities and prescribe penalties for the violation thereof, such ordinances not to be inconsistent or repugnant with the provisions of this act.

Sec. 9. Any person failing to comply with the requirements of this act or violating any of its provisions, shall be guilty of a misdemeanor and upon conviction in a court of competent jurisdiction shall be punished by a fine not exceeding \$100.

Sec. 10. All acts and parts of acts in conflict with the provisions of this act are hereby repealed.

Sec. 11. This act shall take effect and be in force from and after its publication in the official State paper.

Herbert E. Smith, of Jersey City, has been awarded a verdict for \$500 damages against the Jersey City, Hoboken and Paterson Railway Company, on account of injuries sustained in a collision with one

of defendant's cars. The amount sued for was \$5,000.

New Castle, Ind., now has an 8 mile ordinance.

The J. A. Scott Motor Works, St. Louis, Mo., has filed a petition in involuntary bankruptcy.

The city council of Pittsfield, Ill., has passed an ordinance limiting the speed of automobiles to 3 miles an hour.

The authorities of Lowell, Mass., are rigorously enforcing the local ordinance requiring mufflers on motor cycles.

Forest Park and the Forest Park Cemetery, of Camden, N. J., will hereafter be closed to automobiles and motor cycles.

The Century Motor Vehicle Company, of Syracuse, N. Y., is financially embarrassed, and has called a meeting of its creditors.

Writs of attachment have been served on the Marsh Motor Cycle Company, of Brockton, Mass., and the factory of the concern is now closed.

Winnetka, Ill., requires every automobile to be equipped with brakes with which it may be stopped within 10 feet. The speed limit is 10 miles.

Daniel Quigley, of Philadelphia, has been awarded \$7,500 damages for injuries sustained in a collision with the automobile of George L. Thompson, also of Philadelphia.

The automobilists of Milwaukee, Wis., are making an effort to have local laws drafted along the same lines as the statutes recently enacted in the States of Connecticut and Delaware.

George W. Crawley, of Newton, Mass., was arrested June 30 for warning four automobilists of a police trap that had been prepared for them. The charge is interfering with the police.

In accordance with the provisions of the Bailey law, Robert Fulton, of New York city, has been sentenced to pay a fine of \$15 and to refrain from operating an automobile for two weeks.

The Automobile Club of America has decided to make a test of the licensing provision of the Bailey law. The case of James P. McWilliams, who was arrested on June 27 for running without a license, will be the one fought.

An ordinance recently passed by the supervisors of Marin County, Cal., requiring automobilists to keep off certain roads after dark is meeting with general violation. Local operators are courting arrest, and there are a number of test cases on.

Judge Kimball, of Washington, D. C., has held that a garage is not a livery stable, in the case of Frederick B. Weston, who was charged with maintaining a garage where a livery stable would not have been permitted. The case will be appealed by the plaintiffs.

H. L. Blum, of Hackensack, N. J., who was convicted last April of causing the death of one person and the serious injury of another by the reckless speeding of his automobile, paid the \$500 fine assessed.

Mr. Blum's ride is said to have cost him \$6,000 to date.

Nearly 1,500 licenses have been taken out in Chicago, in conformity with the provisions of the new local ordinance.

San Francisco is agitating an ordinance providing penalties for the dripping of gasoline from automobiles on asphalt streets, which it is said disintegrates the asphalt.

The Milwaukee Automobile Club has decided upon two new clauses which it seeks to have incorporated in the local automobile ordinance. It also recommends that horns be permitted as alarms.

The City Council of Andersonville, Ind., at its last meeting, July 6, adopted an ordinance restricting automobiles to a speed of 8 miles an hour. Licenses and numbers are also provided for.

A petition to have the Foster Automobile Manufacturing Company, of Rochester, N. Y., declared bankrupt has been instituted by three Rochester banks. It is alleged that the company owes upward of \$40,000 and has assets of only \$2,000. Park Denmore, the president and treasurer of the concern, is declared to have abandoned it.

The coroner's jury, of Oshkosh, Wis., has held Dr. Henry H. Muggley, of the National Automobile and Motor Company, responsible for causing the death of Alfred H. Tuttle, of Oshkosh, Wis., by running into him with his automobile, July 3. Witnesses testified that the machine was going at from 8 to 10 miles an hour. It is said that a civil suit for damages may follow.

The constitutionality of the Bailey law was attacked last week in the Court of Special Sessions by Charles Thaddeus Terry, attorney for the National Association of Automobile Manufacturers. It was argued—first, that the law takes property without making compensation, in that it forbids a person to operate an automobile after a fourth conviction, even though the only violation be a failure to carry a certificate along; second, that it is class legislation, inasmuch as it provides that dealers may operate vehicles without license numbers; third, that it is double taxation, which is expressly prohibited by the State Constitution, in that it provides a further tax on personal property already taxed as such; and, fourth, that it interferes with the individual's equal right to the use of the highways. Mr. Terry has been asked to submit a brief alleging the foregoing, whereupon a court ruling will be forthcoming.

An observer states that in the hill climbing contest at Chateau Thierry, France, the process of eliminating pairs to reduce weight was carried to an extreme; there were vehicles without tanks, without pipes, without radiators, and with most of the bolts securing the motor and change gear case to the frame removed.



An automobile station is being agitated for in Winnipeg, Canada.

The Sawyer Carriage Company, of Lowell, Mass., is about to open a garage.

B. C. Barry, of Barry & Hayes, of New York, has bought out his partner's interest. The Packard transcontinental tourists have now reached Price, Utah, east of Salt Lake City.

B. B. Emery has taken the Boston agency for the Cameron car and reports seventeen sales to date.

George W. Cannon will soon have another try at the mile track record—this time on the course at Readville, Mass.

Harry A. White and Claiborne S. Williams have just opened an automobile agency and storage station in Memphis, Tenn.

Automobile and motor cycle races were held at Pittsfield, Mass., on July 4, under the auspices of the Berkshire Automobile Club.

We are informed that R. H. Macy & Co., of this city, have ordered fifteen electric trucks from the Electric Vehicle Company.

The Knox Company are said to have been demonstrating their delivery wagon to Boston wholesalers lately with very good results.

It is reported that the Street Cleaning Department of New York city has selected the Stevens-Duryea car for the use of its inspectors.

The machine in which L. L. Whitman, of Los Angeles, Cal., has started to run from the Pacific Coast to New York is an Oldsmobile.

A two story brick building is to be erected in Grand Rapids, Mich., to be occupied by C. J. Bronson as an automobile garage and repair station.

The Boston Automobile Dealers' Association has secured the Symphony Hall for its second annual automobile show, to be held the week of March 14, 1904.

F. A. La Roche has posted a \$500 forfeit with the Empire City Trotting Club, of New York city, for a match with Barney Oldfield, to take place on July 25.

It is reported that the Oil Well Supply Company, at Twenty-first street and Railroad avenue, Pittsburgh, Pa., has under construction a 24 horse power gasoline truck.

It is stated that the Pennsylvania Electrical and Railway Supply Company, of Pittsburgh, is soon to commence the manufacture of a buckboard automobile, to cost \$550 and to weigh 600 pounds.

The Decker Automobile Company, of Oswego, N. Y., plans to locate in Binghamton, N. Y. As soon as the move can be effected the company is to be recapitalized at \$50,000.

Barney Oldfield established a new world's record at Marion, Ind., on July 9, by driving an automobile a mile on a half mile track in 1:16 2-5.

The James A. Clark Company, of Utica, N. Y., is building a touring car to be known as the Herkimer. The first machine, of 18 horse power, has already been completed.

The Continental Caoutchouc Company, of New York, has opened an office at 208 Broadway, this city, to represent the Continental Caoutchouc and Gutta-percha Company, of Hanover, Germany.

The Fawkes Rubber Company, No. 1526 Stout street, Denver, Col., who until recently had their cushion or "airless" tire manufactured for them in Akron, Ohio, are now preparing to build a factory in Denver.

An automobile belonging to J. H. Francis, of Chicago, was completely wrecked one night last week by running into a pile of paving stone that had no warning light. The four occupants were severely bruised and cut.

W. K. Vanderbilt had his eyesight endangered on Friday, July 3, by the explosion of a searchlight on his automobile in France. He went to Paris by train and was there confined to a dark room for some time.

Captain Harry Hansen, a Swedish sailor, who was at the time acting as chauffeur for Dr. Ogden D. Edwards, was crushed to death at the top of Put's Hill, near Greenwich, Conn., last week—his machine overturning in a ditch.

Barney Oldfield broke the world track record for one mile (held by himself) at Columbus, Ohio, on July 4, the new time being 56.2 seconds. He also broke the track record for 10 miles (formerly held by Winton), making the time 9:54.4-5 seconds.

The Ford Motor Company, Detroit, have added to their car an auxiliary spring for use when carrying four passengers. It is semi-elliptic, is bolted to the frame at its middle, and the ends rest against the inside of the lower half of the regular springs.

The Columbia Engineering Works, Inc., of Brooklyn, have taken up the manufacture of the Arthur Herschmann steam wagons, and will build trucks of 3 tons and 6 tons capacity, respectively. The firm has established an automobile department, and the shops have been equipped with additional tools specially adapted to this work.

Banker Brothers Company report sales for the week ending July 10 to Alexander Allen, of Chestnut Hill, Pa. (two machines); Chas. E. McInnes, Phineas Prouty, Dr. H. I. Jessup and Chas. E. Ellis, all of Philadelphia; Crosby M. Black, of Chester, Pa., and Chas. E. Zimmerman, of New York.

At Beverly Farms, Mass., one of the most fashionable and wealthy summer resorts in the country, the automobilists and

horsemen have come to an agreement whereby the former are to keep off the wood drives and side paths, in return for which courtesy the horsemen agree to urge no restrictive legislation.

The Troy Spring Works, of Troy, N. Y., has gone extensively into the manufacture of springs for automobiles. Besides using oil baths exclusively, for tempering, they pay especial attention to means of retaining the spring laminae parallel with each other, a point which they claim is much neglected in automobile spring construction.

The Empire City Trotting Club, of Yonkers, N. Y., has brought charges against Alexander Winton before the Racing Board of the American Automobile Association. The complaint is based upon Winton's refusal to race Fournier on the Empire City track, on July 25, arrangements for which were made through Charles B. Shanks.

In the Minneapolis races on Wednesday, July 1, E. H. Moulten won the "Derby event," open to all machines, with his Peerless car, in two heats. J. B. Gilfillan, Jr. (Winton), was awarded second prize, and G. W. Peavey (Winton) third. Not nearly the whole program of the races, which were to last five days, was carried out, owing to continuous rain.

In a test of a Brennan gasoline motor of nominal 6 horse power, by Albert Barnes, professor of mechanical engineering in the Mississippi Agricultural and Mechanical College, 9.9 horse power were developed at the brake, we are informed, at 900 revolutions per minute. The engine was then driving the circulating pump and Professor Barnes thinks that the total power developed was over 10 horse power.

Fayette Brown, James Barnett, Frank A. Arter and Dexter B. Chambers, all of Cleveland, Ohio, have purchased practically the entire stock of the Geneva Automobile and Manufacturing Company, of Geneva, Ohio, and propose to reorganize the concern on a firm financial basis. J. A. Carter, who has been president and general manager of the company, has disposed of his interest and will retire.

The People's Rapid Transit Company, of Western, R. I., which operated three large passenger buses and two delivery automobiles there last winter, have discontinued operations because the field is not large enough to make the venture a financial success. The entire equipment has been placed in the hands of John P. Thompson, the president and treasurer of the company, and will be offered for sale by him.

It is announced that the new factory of the Packard Motor Car Company at Detroit will have three times the capacity of the old plant at Warren, Ohio. The directorate of the concern, as it now stands, is: J. W. Packard, president; Henry B. Joy, vice president; Russell A. Alger, Jr.; Truman H. Newberry, Philip H. McMillan, Chas. A. Ducharme, D. M. Ferry, Jr.; Fred M. Alger, Richard P. Joy and Joseph Boyer. The capitalization is \$500,000.

Chicago-Mammoth Cave Tourists Home Again.

In our last issue the trip of the Chicago tourists was described as far as Cincinnati. They continued from there on Friday, July 3, to Lexington, 96 miles. The weather was rather warm to thoroughly enjoy the trip. Lunch was taken at Williamstown, Ky., and Lexington was reached in the evening and the night spent there.

On the following day, near Danville, a tire came off the Winton and the car dashed into a telegraph pole, bending the rear axle, but a nearby blacksmith succeeded in about two hours, with assistance and suggestions from the tourists, in straightening it out again.

J. B. Burdette's Darracq gave considerable tire trouble again and Burdette stopped at Springfield and went to the Cave by train. Scott in his Northern withdrew at Bardstown.

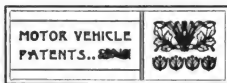
On Sunday the last lap to the Cave, 99 miles, was started upon. The route led through a desolate country and over very poor roads, but the Winton and Peerless, which were now the only cars remaining in the run, reached their destination in safety at 10 p. m. The homeward trip was started upon on Monday, July 7, Bardstown being reached at 5 p. m. the same day. At Bardstown the tourists made a short stop, and were met by others of their party who had not ventured upon the trip to the Cave.

Indianapolis was passed on Wednesday morning, July 9, Burdette being first to arrive at this place. C. W. Gray, with his Peerless, led the procession in the start from Jeffersonville for Indianapolis at 6 a. m. Lunch was taken at Indianapolis and the trip continued.

The last night was spent at Logansport and Chicago was reached on Saturday at 11 a. m. Three machines returned to Chicago, the Peerless, Winton and Darracq, only the first two having made the entire trip, however, which is estimated as 1,300 miles in length. The tourists were all in good health and in condition to continue if necessary. They had on the whole better luck on the return trip than on the way out.

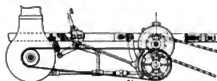
Start of the Big Cars in Ardennes Race.

In describing the start of the big cars in the Ardennes race a writer says: "A little time of waiting while the machine successfully counterfeited an earthquake and a volley of musketry, and the word was given. The car lurched forward down the steep cobbled descent that leads from the little town up the long tree lined hill beyond, and so melted into infinity. Another took its place, to be released a minute later for a similar dart into space, and so on, minute by minute, until all the twenty-six had gone."



United States Patents.

731,588. Power Gear and Brake Apparatus for Automobiles.—T. P. Meinhard, of Brooklyn, N. Y. June 23, 1903. Filed December 4, 1902.

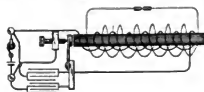


No. 731,588.

The object of the invention is to provide an improved power gear and brake apparatus for road vehicles operated by power in which the power may be released and a brake applied by operating a foot lever or levers. The apparatus comprises motor, change speed gear, power releasing device and brake. The drive to the variable speed gear is by means of a belt. The change gear box is pivoted in such a way that it may be swung around the secondary shaft. A pedal is provided by means of which the lower part of gear box can be swung forward until the pulley ceases to tighten up the belt sufficiently to transmit power. If it is moved further the pulley will bear against the brake shoe. Thus when the brake is applied power is released automatically.

732,014. Induction Coil.—J. Splittorf, of New York, N. Y. June 23, 1903. Filed April 8, 1903.

When a spark is no longer produced between the contact points in the secondary circuit of an induction coil with the operation of the usual engine make and break device, one of the causes to which such failure can be attributed often proves to be adherence of the spring held armature or vibrator to the contact point of the adjusting screw, whereby discharge of the primary circuit occurs only at said engine make and break, an easier path being thus provided than that which includes the usual condenser. Because "sticking" of the vibrator is a matter of common occurrence, as when the engine is running at high speed, and is very detrimental to the even running of explosion engines using the "jump spark" form of ignition, it is evidently extremely desirable that means should be provided insuring the production of sparking between the secondary spark points irrespective of as well as in



No. 732,014.

conjunction with the vibratory action of the armature. The invention provides means whereby the operation of the engine make and break or its equivalent positively insures the production of the secondary jump spark under all conditions of activity or inactivity of the armature spring. The invention consists in the employment of an auxiliary condenser insulated from the usual condenser or from other members or elements of the coil. The cut shows an induction coil with the various terminals and contacts and the auxiliary condenser in circuit. In addition to the usual component elements of a jump spark coil an auxiliary condenser is provided, which in the cut is located under the condenser in the primary circuit.

732,647. Power Transmitting Device.—George W. Marble, Buchanan, Mich. June 30, 1903. Filed November 28, 1902.

732,278. Noiseless Tire Protector.—Lincoln C. Cummings, Pasadena, Cal. June 30, 1903. Filed July 14, 1902.

732,612. Rotary Engine.—Edward J. Beakley, Charlotte, Tenn. June 30, 1903. Filed September 13, 1902.

732,510. Vehicle Frame and Driving Axle Gear.—Geo. R. Boulding, Wells, Nev. June 30, 1903. Filed December 31, 1902.

732,590. Lock Nut.—August Scholer, Pittsburg, Pa. June 30, 1903. Filed January 27, 1902.

732,671. Rotary Engine.—Thomas M. Andrews, Nashville, Tenn. June 30, 1903. Filed December 26, 1901.

732,247. Controller for Electric Motors.—Eddy R. Whitney, Swampscott, Mass. June 30, 1903. Filed May 2, 1903.

732,079. Power Transmitting Device.—Charles W. Hunt, West New Brighton, N. Y. June 30, 1903. Filed October 29, 1902.

732,415. Compound Sleeve for Flexible Shafts.—Armand Janet, Paris, France. June 30, 1903. Filed October 11, 1902.

732,237. Rubber Tire.—Edward B. Traylor, Akron, Ohio. June 30, 1903. Filed January 26, 1903.

732,404. Rotary Engine.—Richard Foster, Newcastle, Pa. June 30, 1903. Filed January 4, 1902.

732,169. Valveless Pump.—Lewis S. Chapman, Schenectady, N. Y. June 30, 1903. Filed July 27, 1901. Renewed May 4, 1903.

732,351. System of Motor Control.—George H. Hill, Schenectady, N. Y. June 30, 1903. Filed April 1, 1903.

732,032. Sparking Plug.—William Barber, Brooklyn, New York. June 30, 1903. Filed August 20, 1902.

732,111. Roller Bearing.—Julius A. Perkins, Omaha, Neb. June 30, 1903. Filed August 18, 1900.

732,199. Vehicle Wheel Tire.—Samuel C. Lines, Curtice, Ohio. June 30, 1903. Filed December 26, 1902.

732,121. Coaster Brake.—Frank Schmitz, Chicago, Ill. June 30, 1903. Filed April 30, 1902.

731.999. Carburetor and Governor for Hydrocarbon Engines.—Louis T. Hagan, Winchester, Ky. June 23, 1903. Filed August 19, 1902.

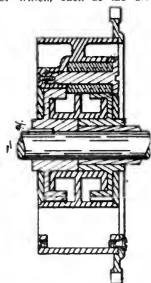
731.545. Motor Road Vehicle.—Nicolas Cernatesco, Craiova, Roumania. June 23, 1903. Filed April 1, 1902.

732.365. Igniter for Internal Combustion Engines.—H. G. Mears and H. W. Aylward, of New York and Brooklyn, New York, respectively. June 30, 1903. Filed November 19, 1902.

The invention relates to improvements in the Le Pontois type of igniters, and provides means for "timing" the ignition. In its preferred form it is built into the flywheel, so as to be protected from injury.

732.327. Compensating Gearing.—H. L. Warner, of Dayton, Ohio. June 30, 1903. Filed September 13, 1902.

The object of the invention is to provide a compensating gear the wearing parts of which, such as the driver, the



No. 732,327.

pinions and their bolts, etc., may be removed without disassembling or removing the entire device. The master gears are mounted on a solid axle and a tube, respectively, and the hubs extend into a hub which is integral with the drum. Perfect alignment of the gears is thus secured. The method employed to mount the pinions is shown in the cut.

732.372. Generator for Igniters.—L. J. Le Pontois, of New York, N. Y. June 30, 1903. Filed August 8, 1902.

The invention relates to electrical generators for producing pulsating or intermittent currents, especially for the production of sparks for igniting purposes. The above application was filed for a patent on a device of which the present one is a modification, designed especially for use with an induction coil. The flywheel represents the movable mass of magnetic reluctance. One or more air gaps are formed in the periphery, in which a metal of high magnetic reluctance may be imbedded. The permanent magnets are straight bars, which are bolted to the magnet of the generator. H

shaped laminations are provided which have two legs that project into proximity of the movable mass, and are surrounded by a coil with one grounded end.

732.346. Electric Igniter.—A. F. Ganz, of Hoboken, N. J. June 30, 1903. Filed January 29, 1903.

The invention relates to improvements in electric igniters of the type suggested by L. J. Le Pontois. The object of this invention is to overcome the defects of the Le Pontois apparatus. These defects are: The brief duration of the current generated and the difficulty experienced in starting. To overcome the first defect an inductor of relatively small diameter is employed and the magnet and coil are so arranged that the cutaway portion of the inductor may extend through a much greater arc. The second defect is overcome by providing the igniter with a plurality of coils.

732.364. Electric Igniter.—H. G. Mears and H. W. Aylward, of New York and Brooklyn, N. Y., respectively. June 30, 1903. Filed November 19, 1902.

The invention relates to apparatus generating an intermittent or alternating electric current for igniting purposes. The igniter is of the Le Pontois type. The object of the invention is to improve and simplify the original apparatus.

732.710. Motor Road Vehicle.—Henri Cauzard, Troyes, France. July 7, 1903. Filed March 31, 1900.

732.716. Vehicle Apron.—Jesse B. Creators, St. Paris, Ohio. July 7, 1903. Filed April 4, 1903.

732.751. Spring Hub.—Herman A. Krezdorn, Seguin, Tex. July 7, 1903. Filed April 30, 1903.

732.812. Sparking Plug.—James C. Anderson, Highland Park, Ill. July 7, 1903. Filed July 31, 1901.

732.843. Method of Preparing Electrolytes.—William Gardiner, Chicago, Ill. July 7, 1903. Filed January 23, 1902.

732.846. Brake for Autocars.—Alexander Govan, Glasgow, Scotland. July 7, 1903. Filed December 9, 1902.

732.880. Rotary Engine.—Jerome S. Mosley, Syracuse, N. Y. July 7, 1903. Filed March 13, 1902.

732.993. Speed Changing Device for Motor Cars.—Adolf Angst, Schaffhausen, Switzerland. July 7, 1903. Filed August 20, 1902.

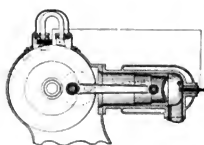
733.052. Rotary Engine.—John Knowles, Colorado Springs, Col. July 7, 1903. Filed September 23, 1902.

733.084. Autotruck.—Charles L. Schultz and Robert A. Schultz, Chicago, Ill. July 7, 1903. Filed July 25, 1900.

733.158. Vehicle Tire.—Jules A. Collet, Brooklyn, New York. July 7, 1903. Filed November 15, 1902.

733.178. Dry Battery.—Eugene M. Fishell and Marcus H. Moffett, Cleveland, Ohio. July 7, 1903. Filed April 14, 1902.

733.181. Flexible Shafting.—Wilber D. Forsyth, Pittsburg, Pa. July 7, 1903. Filed December 2, 1902.



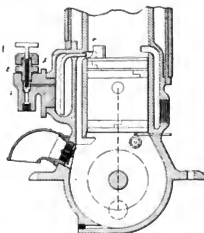
No. 732,371.

732.371.—Generator for Electric Igniters.—L. J. Le Pontois, of New York, N. Y. June 30, 1903. Filed February 15, 1902. Renewed January 10, 1903.

The invention relates to apparatus for producing a pulsating or intermittent electric current for igniting purposes. Its object is to produce a device in which a current can be produced with very little expenditure of power and the efficiency of which increases with use. The essentials of the generator are a permanent magnet having poles, one of which is surrounded by a coil, a suitable movable mass of iron for closing or establishing the magnetic circuit between the poles of the magnet and through the coil, and which mass is provided with a cutaway portion or portions forming a section or sections of high magnetic reluctance, which by the movement of the mass come into the path of the magnetic flux and divert said path, so that it no longer passes through the coil, thus, in effect, moving the field with reference to the coil, which is the equivalent of moving the coil in the field. As a consequence a current will be generated in the coil.

732.343. Internal Combustion Engine.—A. F. Evans, of Cambridge, England. June 30, 1903. Filed February 24, 1903.

The invention relates to two cycle motors. Its object is to provide means to prevent the fuel from entering the crank chamber and causing explosions in it. Further objects are to provide an engine in which the hydrocarbon is not effected by cold and in which the valves do not slam. The fuel feed system is self explanatory. To regulate the motor a perforated disk valve is provided.



No. 732,343.

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- Run "dead" advertisements.
- Misrepresent our circulation.
- Degrade our columns with puffs and personalities.

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- Print better quality and greater variety of reading matter than any other automobile publication.
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- INVITE COMPARISON WITH ANY AUTOMOBILE PUBLICATION THE WORLD OVER.

The Horseless Age.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to
Motor
Interests

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NUMBER 4

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For the issue of September 2, midway be-
tween the summer and the fall touring sea-
sons, we announce a special Touring Number,
confined strictly to this popular and most
enjoyable pastime. The recent growth of
automobile touring in the United States
warrants us in promising a treat for all who
are interested in the subject or who are so-
sceptible to its charms and desirous of joining
the increasing body of American auto tour-
ists. One of the most interesting features of
this number, naturally, will be the depart-
ment set aside for the experiences of tourists
on the road in all parts of the United States
and in foreign countries. In order to make
this department as novel and helpful as pos-
sible the editor invites correspondence from
any of his readers who can contribute suit-
able touring experiences within the specified
time. Instructional data or any analogous in-
cidents relating to touring are also desired.
It is our intention in our Touring Number to
provide solid information as well as enter-
tainment, and to stimulate among the Ameri-
can public the love of nature and the most
convenient and modern mode of enjoying it—
automobile touring.

Next Year's Models.

Most of the manufacturers are now at
work on their 1904 models, which will first
be exhibited to the public at the New York
Show in January next. Such work is natu-
rally surrounded with more or less
secrecy, but we have been able to obtain
some information throwing light on the
general tendency in the line of cheap and
moderate priced cars.

As we observed a short time ago, the de-
tachable tonneau car is in great favor with
buyers. The consequence is that there will
be an increased number of this type on the
market next year, and practically all the
makers who have endeavored to produce a
"better grade" of light car will next season
supply tonneau seats at option. Some of
the manufacturers who have already deliv-
ered such cars have come to the conclusion
that a slight increase in power would be a
considerable advantage, and as very large
single cylinder engines are open to a num-
ber of objections there promises to be an
increased number of double cylinder light
cars on the market next year.

The upward tendency in power, weight
and price here noted will be balanced by a
downward tendency in the very light and
cheap machines. In other words, there will
be a much greater difference between the
so called cheap runabout class and the me-
dium grade and weight class next year.
The \$500 runabout is already here and will
be represented by a considerable number of
makes next year. In the medium weight
class there is no sign of price reduction,
the tendency being rather the other way.

The A. A. A. Declines.

Having decided to organize an endurance
contest for next fall the National Associa-
tion of Automobile Manufacturers invited
the American Automobile Association to
join in the conduct of the event and par-
ticularly to take charge of technical mat-
ters. The latter organization has sent in a
declination, with the explanation that it
scarcely feels itself competent in technical
branches and might expose itself to harsh
criticism.

This incident calls attention to the diffi-
culty of securing independent and techni-
cally competent men to take charge of such a
contest. The N. A. A. M., of course, has
at command plenty of technical ability, but
for the direction of a competition of this
nature it is desirable to have men whose
interests are not allied with those of any
competitor. There are, no doubt, also
plenty of independent mechanical engineers
highly competent in other lines of engineer-
ing, but unless their experience includes
considerable work in the automobile line
they could not render efficient service in
so new a branch of engineering.

When the Manufacturers' Association
asked for the co-operation of the Auto-
mobile Association one of its motives was
probably that the general public would at-
tach greater importance to a contest held
under the auspices of an independent or-
ganization of automobilists than to one or-

ganized and controlled exclusively by manufacturers themselves. This view is certainly not altogether unfounded, and it would therefore have been most desirable to secure the co-operation of the A. A. A. On the other hand it is well known that the association was not formed to engage in the organization of contests or for the technical advancement of the industry.

Auto Legislation of the British Parliament.

The long promised "Government Bill" to regulate automobile traffic was finally introduced in the House of Lords by Lord Balfour of Burleigh, on Tuesday, July 7. The bill in its general provisions does not differ materially from that worked out by the Automobile Club committee. That is to say, definite speed limits are to be abolished and only reckless driving "at a speed dangerous to the public" is to constitute an offense. Automobilitists are required to take out licenses and cars must carry identification signs, the dimensions and other features of which are to be determined by the Local Government Boards. Offenses in connection with the driving of an automobile may be punished by suspending the driver's license for a definite period.

While the bill abolishes the now prevailing 12 mile speed limit in general, it still leaves the Local Government Boards the right to enforce that limit in any special place, upon the application of a town or county council and with a view to the safety of the public. This clause looks decidedly like local option on speed limits.

Another objectionable phrase, which has already met with protest, occurs in the clause relating to reckless driving, and makes driving an offense which might be considered dangerous to the public, with respect to the amount of traffic which actually is at the time or "which might be expected to be on the highway." This latter phrase is certainly very indefinite, and if English policemen actually are as avaricious and English magistrates as prejudiced as they are painted in English automobile publications it would be highly desirable, from the standpoint of English motorists, that this phrase be struck out.

It is not to be expected that any serious objection to the removal of the specific speed limit will be raised in the House of Lords, as many of its members are ardent automobilists, but the bill will no doubt be somewhat roughly handled in the House of

Commons later on, quite a number of its members being of decided motorphobic inclinations and some districts in England being very much opposed to unchecked motor driving.

Exports Falling Off.

After a phenomenal rise in the value of automobile exports in 1902 a check in the growth of export business was observed during the early months of this year, and more recently there has been a positive decline. One of the reasons for this dropping off has undoubtedly been that the leading American firms have been so busy supplying the home demand that they have made no particular effort to force foreign sales; but it is to be feared, from reports reaching us, that the quality of American machines shipped abroad has not always been up to the standard and that the decline of exports is in part a reaction resulting from unsatisfactory experiences abroad. We would point out that a wide and lasting market can be secured abroad in low and medium priced cars, because, since nearly all the leading foreign makers have confined their efforts to high priced, luxurious touring cars, comparatively little progress has been made in the line of popular priced machines; but nothing is more certain to destroy this market than an attempt to dispose of cars of inferior quality abroad. The experiment was tried in the bicycle business, with the result that while in the early nineties the American wheel was all the rage in England, it is practically unknown there now.

Fostered, no doubt, by English representatives of French manufacturers and others whose trade interests are affected by American competition, the idea has gained ground abroad that cars which cannot be sold here are being dumped on the English market. It would be most timely to counteract the spread of this notion, and above all every precaution should be taken to prevent machines embodying any but first class material and workmanship from being sent abroad.

The Transcontinental Tours.

There are at present no less than four automobile expeditions on the way from San Francisco to New York city—that is to say, four have been reported as on the way during the last month, and so far none of them has finished, nor have we heard of any one giving up. The party

at present in the lead, apparently, was last heard of from Omaha, Neb. He is reported to be a private automobilist and to be making the trip solely for pleasure. We must say that San Francisco-New York does not entirely correspond with our ideal of a pleasure touring route. It is also rather peculiar that nothing was heard of this attempt to cross the continent until practically all the difficulties were behind and the plains States had been reached. The only plausible reason for this avoiding publicity that occurs to us is that perhaps the transcontinental tourist wanted to avoid the contingency of having a lot of others on his heels to contest his chances of first accomplishing the feat. There is little doubt that the bona fide character of some of the trips will be questioned at some future date, and those attempting the run will do well to have records of their passage made at the various stations en route.

It is not surprising that attempts should be made to cover the entire distance from ocean to ocean by automobile. A number of mountain ranges and more or less trackless sand deserts must be negotiated, and the route offers many other difficulties trying to both the power and endurance of the machines and the determination of the drivers. The failure of one or two earlier attempts, of course, adds to the incentive.

Calendar of Automobile Dates and Events.

- July 12—Ostend Automobile Week.
- July 24—Quarterly 100 Miles Trial of A. C. G. B. I.
- July 25—Automobile Races, Empire City Track, Yonkers, N. Y.
- August 10—St.-Louis Motor Bicycle Reliability Trials.
- August 20—International Races of the Frankfurt Automobile Club, Frankfurt-on-the-Main, Germany.
- September 4-12—English Reliability Trials.

Actresses' Automobile Parade.

The "theatrical ladies" of London had a "motor meet" on June 22 last, going down to Otlands Park in automobiles. They were entertained at lunch by the Biograph Company, which ultimately photographed the cars with their occupants in front of the hotel. The run down was quite adventurous, owing to the floods of the previous week not having completely subsided, the trees for instance on either side of the Hampton Court Bridge still standing in some 4 feet of water. Nearly all the leading motor car manufacturers were represented, and among the guests was Mr. Marconi.

Gasoline and Steam Cars Compared.

By ALBERT L. CLOUGH.

Concluded.

QUIETNESS OF OPERATION.

The steady pressure of the steam as applied to the piston, the relatively light weight of the reciprocating parts, the character of the valve mechanism and the absence of a transmission mechanism, including gears, render the steam car almost ideal in regard to noiselessness of operation. In fact this is its most valuable characteristic, so far as its appeal for popularity to the general public is concerned. It, however, is being rather less considered as people become more accustomed to the characteristic sounds of motor vehicles in general.

The presence of a visible exhaust from steam vehicles has been brought forward by some as a partial offset to their noiselessness. In crowded traffic, on cold wet days, this certainly is an inconvenience, but the use of highly superheated steam and air condensers has minimized this objection except when hard work is being performed or when the air is already saturated with moisture.

The impulsive character of the working pressure as applied to the piston, the comparatively great weight of the reciprocating parts, the relatively high exhaust pressure, the use of clattering poppet valves, the employment of gears in the transmission device and other considerations have given the gasoline vehicle a reputation for noisy operation which has often been deserved.

A great deal of effort has been expended in eliminating this disagreeable accompaniment of the operation of hydrocarbon cars. Mufflers have been greatly improved and, if of sufficient size and proper construction, can silence the exhaust to little more than a gentle hiss without the production of a serious back pressure. The reciprocating parts of gasoline engines have been carefully balanced, and the increased use of multi-cylinder construction has resulted in a uniformity of torque and a smoothness of operation that are highly satisfactory.

More perfect ignition methods have obliterated the noise of missed explosions; the employment of spark governors, and a better understanding as to the proper time of ignition upon the part of users of manual spark timers have resulted in smoother operation, and the provision of more perfect methods of correcting wear in the bearings of the moving parts has made it possible to keep engines in quiet running order.

Better carburation and some other improvements have resulted in the ability to run gasoline engines at extremely low speeds when the vehicle is at rest, with a consequent reduction of noise; and better throttling devices have enabled operators to run very slowly on the high gear, which is generally the quietest.

The greatest improvement in the direction of noiselessness has resulted from the

elimination of gears upon the most used speed—generally the high. The best practice now calls for direct connection between the engine and the driving wheels when the customary "driving" speed is in use, and for the resort to gears only for hill climbing or for negotiating very bad road conditions.

Complete enclosure of the speed reducing gears in an oil case has greatly reduced their noise when they have to be employed, but the securing of noiselessness at the sacrifice of reliability by the employment of fibre gears is a very doubtful expedient even in very small cars.

Modern gasoline cars operated by multi-cylinder balanced motors, properly muffled, with gearless operation on the "sped" which is intended for customary use, cannot be called objectionable as regards noise. Nevertheless, steam vehicles are inherently more quiet in their operation and give satisfaction in this regard naturally and without the precautions necessary to be observed with gasoline cars.

ODOR.

The combustion of gasoline in the burner of a steam vehicle gives rise to a slight though characteristic odor. Little objection can be made to it, however. As the gasoline vapor is burned in an excess of air its combustion is likely to be very perfect.

The combustion of gasoline in an internal combustion motor produces a decidedly different and more objectionable odor, which is compounded of gasoline, often somewhat imperfectly consumed, and of volatilized or chemically altered cylinder oil, which escapes from the hot cylinder walls with the exhaust. The occupants of a motor vehicle themselves are seldom troubled by this odor, but, in the interest of the general public, it should be reduced to the lowest practicable point.

By the employment of carburetors which furnish a perfectly combustible and uniform mixture under all conditions of demand, by the attainment of perfectly regular and complete ignition and by the use of cylinder oil of exceedingly high temperature test and in an amount just sufficient to insure proper lubrication without excess, the odor arising from the operation of a gasoline automobile may be minimized to such an extent as to become practically unobjectionable.

CONTROLLABILITY.

In this regard I consider the cars operated by the two motive powers to stand upon an almost perfect equality. They may truthfully be said to be perfectly controllable; infinitely more controllable than animal drawn vehicles. The aspersions as to the controllability of motor cars cast by the would be "funny papers" are so grossly untrue that they have already ceased to amuse even the most ardent motorphobes.

There is an impression current that steam cars are more controllable than gasoline vehicles, but I think that this has arisen from the greater agility in manoeuvring which

they possess, due to their boiler reserve. When the throttle of a steamer is opened the car leaps forward instantaneously, and if the reverse is thrown it will leap back with equal energy, in a manner decidedly in contrast with the more sluggish, though none the less accurate movements of the gasoline car. This performance strikes the superficial observer as a great display of controllability, but to one who considers it appeals not as an advantage, but rather as a danger. There are generally more control levers on a gasoline car than on a steam vehicle and there is somewhat more for the operator to learn in order to achieve facility in manoeuvring than with a steam car. The fact that the matter of brakes has generally received more careful attention from the manufacturers of gasoline vehicles than from the steam car builders, and the fact that the power may be instantly cut off either by releasing the clutch of the gasoline car or by shutting off the spark are decidedly favorable considerations.

As to the relative effectiveness of vehicles of the two motive powers in

HILL CLIMBING

and encountering sand there is something to be said. The steamer is equipped with an engine which is capable of carrying a large overload and with a boiler in which is stored a large amount of energy (except in those of the flash type). The capacity of the engine to use steam is very generally greater than that of the boiler to produce it. This boiler reserve and large overload capacity of the engine endow the steamer with remarkable powers of momentary exertion, such, for instance, as the horse possesses. A short steep hill may be climbed by a steamer at a speed that is truly impressive, at the expense of the reserve energy in the boiler. If, however, the hill is too long, and too great speed has been attempted, the pressure may fall very greatly, owing to the demands of the engine being in excess of the powers of the boiler to supply. If the steam falls to the stalling point and good brakes have been provided, the car may be held and the attainment of the requisite steam pressure awaited, when the ascent of the hill may be completed. A steamer will free itself from a very bad "hole" by "hotting up" steam and then making a supreme effort. Often the power momentarily developed may be in excess of the capacity of the tires to transmit to the road surface, in which case the wheels will slip.

I think it will be admitted to be very uncommon to find a steamer permanently "stuck" upon a hill or in sand. Upon roads which are exceedingly bad for long distances and which demand an amount of power equal to or in excess of the continuous capacity of the boiler, the progress of a steam vehicle is likely to be somewhat slow and very different from its boulevard operation. There is likely to be much recourse to auxiliary water pumps, and some little exercise obtained. However, it is a fact that even the steam runabouts

will travel almost any road, however bad, if enough water and gasoline can be secured. The pace may be decidedly slow.

It should be said right here that one is likely to fall into error in making this comparison of the two motive powers in respect to traveling capacity over bad roads, for the simple reason that one is likely, almost unconsciously, to compare steam runabouts with gasoline touring cars—two classes of vehicles intended for very different purposes. There have been so few steam touring cars constructed in comparison with the gasoline vehicles built for that use that the steam vehicle is represented in the minds of most people by the familiar runabout type. It should be remembered that some steam cars of avowed touring capabilities are being built which doubtless possess boilers of sufficient capacity to steadily meet the maximum demands of the engine and power pumps capable of maintaining the water level under the most trying conditions. Such cars may be expected to make sufficiently high speeds to meet rational touring requirements, even over the worst roads. Their actual fitness for touring bad roads has yet to be demonstrated.

The gasoline engine has very different characteristics as to power production from the steam engine. If it is receiving an unthrottled cylinder charge of perfect mixture, with the spark in its most advantageous position, it is doing its utmost. There is no boiler upon which it can draw, and if the amount of power demanded by the vehicle is ever in excess of the rate of its generation, the vehicle will stall. On the other hand, the gasoline motor will keep on developing its full power until its fuel is exhausted. With a low gear, sufficiently low, there is no limit to the road resistance that a gasoline vehicle can overcome except the adhesive power of the tires. If this gear is so figured as to give the vehicle sufficient tractive effort to overcome the worst hills or sand to be met with in practice, then it can successfully negotiate the most unfavorable road conditions and do so indefinitely. The highest gear should be so chosen that full advantage may be taken of level stretches or slight inclines, and the intermediate speed or speeds so proportioned as to take care of all hills or sand stretches usually met with. The low gear should, I believe, be just capable of sliding the driving wheels on good footing with the front wheels blocked.

Makers have been charged with the mistake of not furnishing intermediate gears, and of thus being tempted to make their low gears too high, so as not to make the vehicle too slow on moderate grades where the high speed just fails to carry. Certain builders of low powered runabouts in the Middle West have shown great wisdom in making the lowest of their two speeds exceedingly low, as they have thus earned the very just reputation for their vehicles of being able to travel anywhere.

In the opinion of the writer, at least three speeds are most desirable, and this requirement is realized with very little increased complication where a sliding gear transmission is employed and without an excessive increase in parts where the separate clutch system is adopted.

The fact that modern gasoline touring cars are equipped with a "first" or low gear practically fulfilling the above specification, and the further fact that their motive power is capable of maintaining its full output indefinitely, when desired, without attention, have led to their present practical monopoly of the touring field. If a gasoline car will climb a few hundred feet of a certain per cent. grade on a certain gear it will do so until its gasoline tank is empty. There is no anxiety about the water supply and the operator has only to wait until the grade decreases, when he can immediately "pick up" a higher gear and take full advantage of its greater traveling capacity.

There is something truly impressive in the dogged persistency and "stick-to-it-iveness" of the gasoline motor, as it cheerfully delivers its full power continuously until its tank runs low. It will "lie down" instantly if you demand any more power, but up to its limit it is tireless. The steam engine is no "quitter," but quite the reverse. Its ambition is likely to exceed the powers of its source—the boiler—and when slowed down for long periods under extremely heavy duty it is too often unable to pump the water which it voraciously demands.

Some Considerations in Gas Engine Cylinder Construction.

In no detail of gas engine building is there greater diversity of practice than prevails in the design and construction of cylinders. We have steel cylinders and cast iron cylinders; thick cylinders and thin cylinders; cylinders with water jackets attached; cylinders with water jackets integral, and cylinders without water jackets. We also have cylinders with solid heads and cylinders with removable heads. In no respect do we find definite standards established—almost every maker using features disapproved by others or dispensing with ones that others approve. That this condition of affairs should exist is only to be explained by an absence of data, or by failure on the part of builders to profit by the experience of others. Consequently it should be of interest to consider the various cylinder constructions that have at different times been employed, and also those now in commercial use, together with the arguments commonly urged for and against each pattern.

In analyzing the factors of correct construction the requirements to be met should be first considered. From a moment's reflection on the conditions of power generation in the gas engine, it will appear that its cylinder must primarily withstand three things—heat, pressure and friction—

and that its construction will naturally fall into two classifications—one, the question of design; and the other, the question of material. It is also to be considered that only approximate success is possible, inasmuch as a good result in one regard may tend to a poor one in another. For instance, conditions of efficiency demand that: explosion temperature be as high as possible, yet the endurance of metal requires that the cylinders be kept from becoming unduly hot. Likewise, durability, lightness and simplicity would call for the use of the strongest steel and fewest parts, while structural difficulties may necessitate a built up construction and a less strong but more easily manipulated metal.

To dispose of the question of material—soft gray cast iron is generally used, chiefly because of the facility with which it can be cast and machined. Cast steel is used less, because of the difficulty of securing homogeneous castings; while forged and other steel constructions are exceedingly expensive to make, and also require attached water jackets—by many considered objectionable. No means the least of the advantages of iron and steel is their poor capacity as conductors of heat, thus making them slow to take up the heat of the ignited mixture.

The matter of design is more complex. Strength, liability of breakage, convenience of repairs, arrangement of wearing surfaces, provision for cooling, efficient operation and ease of manufacture must all be taken into account.

Strength is, of course, only to be attained if the walls are sufficiently thick and bear a proper relation to the size of cylinder, to the maximum pressure involved, and to the tensile strength of the metal employed. The fact that the inside of the cylinder wall is exposed to intense heat, while the outside is subjected to a cooling process, is a reason for making it as thin as other considerations will permit, lest it suffer from stresses set up by expansion and contraction due to the differences of temperature. A prolific source of cracked cylinders is freezing of the jacket water.

Convenience of repairs is largely a matter of accessibility and provisions for adjustment. Cylinders that can readily be dismounted and taken apart are unquestionably advantageous in this respect. Interchangeable parts, removable heads and jackets, and wearing surfaces that can easily be reached with tools cannot fail to present advantages that will not exist in other forms of construction.

The wearing surfaces in a gas engine cylinder are the inner wall, the valve seats and bearings. The first of these should be accurately bored, smoothly finished, and provided with means of ample lubrication. The valve seats should be so located as to admit of the valves being reground to seat as often as may be necessary, and also should be so placed as not to become coated with oil or encrusted with carbon deposits. One point of good mechanical common

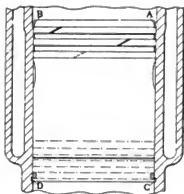


FIG. 1.

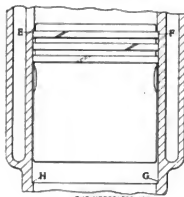


FIG. 2.

sense, universally observed in steam engine practice, but often neglected by gas engine builders, is the boring of the cylinder slightly larger at the extremes of the piston travel, in such a way that the piston rings will, at the end of each stroke, lap slightly beyond the shoulder thus formed. In this manner a great deal of wear can occur without interfering with readjustment. Fig. 1, in which A, B, C and D denote the extreme positions of the piston rings, will make this point clear. Fig. 2 illustrates what occurs in a plain bored cylinder after it has been used for some time. Here, at E, F, G and H, are shoulders, left at each end of that portion of the cylinder wall which is swept by the piston rings. When such shoulders have once been formed the slightest readjustment of the connecting rod or crank shaft bearings will cause the piston rings to abut against these shoulders and bring about the destruction of the engine.

The cooling system of a gas engine is provided simply to cool the cylinder—not to abstract heat from the contained gases, as some people seem to imagine. For this reason the cylinder walls should work hot and be poor conductors of heat. Beyond these considerations, all heat that the cylinders take up should be disposed of by radiation.

In primitive motors the plain outside surface of the cylinder was expected to radiate its heat into the atmosphere. The now obsolete Kanc-Pennington engine was perhaps the most advertised example of this type. The surface exposed to the air in this manner having been found inadequate to effect proper cooling, efforts were made to increase its area by various expedients. One of the pioneers wound his cylinders with a wire helix; others cast or attach radiating flanges or ribs upon them; while another studs his cylinders with steel pins, threaded from end to end to increase the radiating surface. Properly designed flanges and pins give excellent results and are much used, often in connection with an artificial draft induced by a fan.

In its most elaborate form a cooling system consists of a water jacket, a circulating system, a pump, a tank, a radiator and a fan—intermediate forms often dis-

persing with certain of the least necessary of these.

When cylinders are built with water jackets, if cast integral, it is very hard to secure good castings, on account of the difficulty of preparing a mold with properly placed cores. These difficulties become especially formidable if the cylinder and head are cast in one piece, few foundries caring to undertake the latter class of work. A large proportion of all castings made with water jackets prove defective in the foundry or on the testing block. On this account, and because of the danger of freezing, a few manufacturers use plain cylinders with attached copper jackets. This, however, introduces new difficulties in the way of joints that may prove troublesome to keep from leaking. Attached copper jackets, seemingly well calculated to obviate such troubles, were illustrated in the issue of *THE HORSELESS AGE* of September 3, 1902, and February 28, 1903.

With any cooling system it is quite as desirable that the radiating members or media should rapidly conduct the heat away from the cylinders as it is that the latter should abstract heat slowly from its contained gases. This circumstance is giving rise to an increasing use of copper for radiating flanges on air cooled engines, and should insure the continued use of water for cooling jacketed engines—both water and copper standing high in the scales of heat conductivity for liquids and metals, respectively.

The placing and proportioning of water jackets are important questions that have only recently been accorded the study they deserve. It is now the rule to have the jacket extend over the head and ignition chamber and down the sides of the cylinder to the point of lowest travel of the top of the piston. A tendency to employ jackets with more water space than formerly has recently become pronounced.

In fastening separate cylinder heads to cylinders, the joint thus necessitated has been the subject of many designs and much difficulty. Common practice has been to pack it with asbestos, but unless constant vigilance be exercised the packing is likely to be blown out or forced into the water jacket after a short period of use. Placing

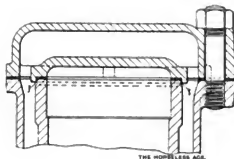


FIG. 3.

of a wire mesh in the asbestos is one method that has been used to minimize this trouble, while the plan illustrated in Fig. 3 has been suggested as another means of surmounting the difficulty. By this plan the raised ring at I and J is intended to hold the packing in place against the cylinder pressure, without depending wholly upon its frictional contact with the ends of the cylinder and head. Copper gaskets are often used by repair men in place of asbestos packing, and are said to give excellent results.

Multi-cylinder engines have given rise to diversity of opinion as to whether the cylinders should be of the individual type or cast together. In the latter case it is contended by some that the water jackets should extend between the cylinders, while others declare for the single dividing wall.

From the commercial standpoint ease of manufacture is an important requisite. Other things being equal, the engine designs that embody the fewest structural handicaps, and that lend themselves most readily to quick manufacture, are certain to prevail. Low cost and reasonable utility must always be more important than scientific perfection.

A New Field for the Nernst Lamp.

The Nernst Lamp Company, of Pittsburg, Pa., will soon place on the market a fifty candle power Nernst lamp, suitable for use on direct current circuits. This being the case the application of this powerful and efficient light to electric automobiles would seem not to be far distant. The Nernst lamp uses only half as much current as the incandescent for a given candle power, and is better adapted for locating in the focus of a parabolic reflector. For automobile headlights it might be necessary to rearrange the parts and provide special means of keeping the glowler from breaking. With the voltages most used in electric automobile practice it might also be necessary to use lamps rated for slightly lower voltages than those at which the best results have so far been obtained.

In the Phoenix Park (Dublin) races on July 4 the event for tourist cars valued at £300 or under was won by a 10 horse power Duryea in 2m. 27 4/5s.

LESSONS OF THE ROAD

New York to Oconomowoc—A 1,200 Mile Automobile Tour.

By J. M. HARTSHORNE.

On Tuesday, June 16, after a fortnight of rain and in the face of leaden skies and muddy roads, I left New York in a recently imported touring car for a trip to Oconomowoc, Wis. My party consisted of a friend and two mechanics, one being a chauffeur who had run a similar car and whom I took along to instruct us, as neither my man nor I knew much about my car, having been out in it only once.

We made our start from Fifty-ninth street at 10 a. m., lunched at Peekskill, and, passing through Poughkeepsie, dined and spent the night at Millbrook. This was rather a roundabout way of reaching Albany, but as we were not in any special hurry, we had decided to see something of the Berkshires. Leaving the next morning at 10:25 we lunched at Great Barrington and afterward drove through Stockbridge and Lenox, and brought up at Pittsfield for the night. The roads, usually very good, were heavy with mud, but the views of course were beautiful, and we felt more than repaid for the loss of time.

As it rained all Wednesday night and until 10 o'clock Thursday we did not start for Albany until after luncheon. The State road over Lebanon Mountain was fine and the scenery exquisite, but from West Lebanon to Nassau the road was horrible. It had been repaired, which meant covering it with the mud from the ditches, and we had to wallow through it. It was slow work



IN THE DITCH NEAR FAIRPORT.

and we did not reach the Hotel Ten Eyck, at Albany, until 7:45 p. m.

Only one amusing incident occurred to enliven the journey. This was meeting a man with a mettlesome horse who scorned our advice to turn into his own yard and insisted on driving past, calling out, "I own this horse and I'll do as I please with him." He finally got by, but his wife had hysterics on one side of the road and he nearly had heart failure on the other.

As so many have made the run from Albany to Buffalo I shall not go into all the details of ours, but give the stopping places in a table at the end. Our only adventures

during this part of the trip were due to the muddy roads. A little west of Schenectady we were caught in a heavy thunder storm, in the midst of which we skidded into a deep mudhole. Letting down the glass front and side curtains we sat waiting for the rain to let up. Just as it did, along came a negro with a pair of big black horses, and as he offered to pull us out for 50 cents we consented to be humiliated, both wheels on the right side being buried up to the hubs.

At Amsterdam, where we stopped for luncheon, we were told that the roads to the west were being repaired (!) and were impassable even for the local automobilists, so we applied for permission to use the towpath of the Erie Canal, and through the kindness of a member of the Legislature who lived in Amsterdam we secured it.

Our afternoon ride alongside the canal was delightfully novel and, much to our surprise, the views were fine, and we were almost sorry when Fort Plain was reached. Saturday we again used the towpath, reaching Utica early in the afternoon. As it was then raining hard we decided not to attempt to go any farther that day. The rain continuing all Sunday, we did not get away until Monday.

Although we had enjoyed the scenery and the good going on the towpath, the fear of skidding into the canal after so much rain, or of frightening some of the mules into it, forced us to try the road again. It was slow, heavy pulling all the way to Syracuse. Tuesday it again rained all day, but Wednesday being clear we started at 8:30, and, choosing the lesser of two evils, followed the towpath to Clyde, where a good luncheon, preceded by something with a cherry in it, somewhat restored our nerves, which had been sadly shaken by those fool-



IN THE MIRE ON A BOULEVARD NEAR WEEDSPORT, N. Y.

ish mules, for almost every team we met that morning seemed seized with a wild desire to breast the raging canal, and only the exertions of my two men and occasional quarters given to the mule drivers saved me from being ruined, for of course drowned mules would have been exceedingly expensive. Taking to the highway after luncheon we were treated to heavy thunderstorms at Newark and Palmyra, and near Fairport we suffered from the effect of the rain, for we slid off the road into a deep ditch. Application at the neighboring farmhouses failed to secure horses, all being away, but just as we were getting anxious a farm wagon came along and pulled us out. Fifty cents gained us the farmer's approval. As though we hadn't had trouble enough, a rock, hidden in the mud, tore off the aluminum guard below the flywheel. This gave us a horrid fright, for if the flywheel were hit and the shaft bent we were out of business. Everything seemed all right, however, and we were soon on the 10 miles of beautiful road leading into Rochester, reaching there at 7:50.

Next day, on the way to Buffalo, we met a man to whom, if I had his name, I'd like to send a medal for his display of courage and brains. When we were still a full half mile away this yokel unhitched his horses, leaving a heavy load of stone in the middle of a narrow piece of the road. All efforts to induce him to put in his horses and pull to one side were unavailing, and only met with the answer, "H—l, I suppose you fellows think you own this road." Unable to move the man or the wagon we had to take to the ditch and by all leaning to "windward" we got by without upsetting. Hereafter I may include some dynamite cartridges in the repair kit.

In Buffalo we lost half a day by having



SPRAKER'S, ON THE ERIE CANAL JUST WEST OF AMSTERDAM, LOOKING EAST.

the rear mud guards raised some 2 inches. They were so low that they kept bumping down on the tires and scraped both outer shoes so badly that these had to be left in Cleveland later on to be recovered.

The road from Buffalo to Erie was very good. From Fremont to Toledo the perfectly straight but miserable turnpike would have been very monotonous had it not been for the many oil wells we passed. About 15 miles west of Toledo, between Holland and Delta, we got stuck in deep sand, but a pair of white horses, tooled by a barefooted farmer, pulled us out, when assisted by the engine. This worthy man asked

only 25 cents for his services and was so pleased on getting a half dollar that he offered to come along and help us through "a bad spot a bit farther along." We thanked him, but told him not to come unless he megaphoned him. By following his advice of sticking to the ruts, which, although they looked bad, had a hard bottom, we pulled through without further trouble and were soon on a splendid road, by which we reached Bryan.

On Tuesday, June 30, we had our first runaway. Near Butler, Ind., we slowed down on meeting a farmer driving a cultivator, and when his horses tried to climb the fence the engine was stopped altogether and my men ran forward, got the horses back in the road and straightened things out. The horses finally passed us very quietly, without even being led, and the farmer thanked us very profusely. But, when about 40 yards past, one of the horses reared, and in a twinkling they were off. After running a quarter of a mile down the main road they turned into a lane and finally jumped a fence, cultivator and all, when, concluding that they had shown sufficient spirit, they stopped and began grazing.

The farmer followed quietly after his horses and never once looked back. I should have felt better if he had shaken his fist at us; still, as we hadn't started the engine, we were not exactly responsible for the runaway, though we undoubtedly were the cause. As no great damage had apparently been done, we went on and some ten minutes later met a man driving a mule in an old runabout which reminded us of "the wonderful one horse shay." When about 50 yards away the mule put up danger signals in the form of a pair of long ears, so we slowed down. The driver jumped out, led the mule to one side and



STUCK IN THE SAND 15 MILES WEST OF TOLEDO—"TWO HORSE POWER."

beckoned us to pass. We went ahead slowly, but when about 20 yards away the mule suddenly wheeled and bolted. The man held on to him for about 30 feet, then fell, and the wagon passed over him. We went up close and then all jumped out and ran to him. He was covered with blood, and I feared he was seriously injured, so while the others carried him to the side of the road I rushed back to the car for a flask of whiskey. When I returned, dreadfully frightened, the others told me that the fellow was very drunk, and uninjured except for a bloody nose. We picked up a black looking bottle that had fallen out of his pocket, which he informed us was fine blackberry brandy and that its mate was in the wagon. I suggested that he wipe off some of the blood, but he said no, that his dog, a small hound, which he held in his arms, was a "bloodhound and would lick it off." He added that there were some fine pups in the wagon and expressed the hope that they had not been spilled out. We finally left him reclining against the fence, after promising to find the mule and send him back. We didn't have much hope of finding the wagon except in pieces, and we expected to pick up pups all along the road, but about a half mile farther along we saw the mule standing quietly by the side of the road with his danger signals drooping and the wagon apparently intact. So, backing into a side road, one of the men was sent to get the mule. When he returned we photographed the outfit and then examined things. The pups seemed all right and so did the other bottle of blackberry brandy. The mule was driven back to his owner, but as he preferred reclining on the grass to driving home, the mule was tied to the fence and we went on our way rejoicing.

We reached South Bend that night and Chicago the next, without any further adventures. As my friend was booked to sail for Europe in a few days, my wife and son joined us there, and next day, after seeing him off and lunching, we started for Highland Park, which was reached by a beautiful drive of 23 miles through Lincoln Park and over the Sheridan road, a boulevard running along the shore of Lake Michigan. The next day we passed through Kenosha, Racine and Milwaukee and arrived at Oconomowoc at 6:52.

Thus ended a trip of some 1,200 miles, for the most part through beautiful and interesting country.

Where we had expected to find the best roads, from New York to Rochester, they were the worst. Of course, we had started after a long period of rain, and had several stormy days before reaching Rochester, but it does seem as though the great State of New York might do as much for its people as little New Jersey and give us macadam roads fit to travel on in any kind of weather. From Rochester west the roads were good, except for short stretches, and from Toledo they were generally fine. We had fairly good weather after leaving Rochester, so of course I can't say how

	Miles.	Hours.	Minutes.
Tuesday, June 16, New York to Millbrook.....	91.5	8	17
Wednesday, June 17, to Pittsfield.....	61.5	5	55
Thursday, June 18, to Albany.....	39	5	10
Friday, June 19, to Fort Plain.....	60	6	45
Saturday, June 20, to Utica.....	40	4	..
Sunday, June 21, Rain.....	..	..	..
Monday, June 22, to Syracuse.....	49	5	45
Tuesday, June 23, Rain.....	..	..	..
Wednesday, June 24, to Rochester.....	82	10	35
Thursday, June 25, to Buffalo.....	72.5	6	30
Friday, June 26, to Dunkirk.....	50.5	4	30
Saturday, June 27, to Cleveland.....	145	11	45
Sunday, June 28, to Fremont.....	83	6	55
Monday, June 29, to Bryan.....	100	9	15
Tuesday, June 30, to South Bend.....	110	8	10
Wednesday, July 1, to Chicago.....	111	7	30
Thursday, July 2, to Highland Park.....	23	1	45
Friday, July 3, to Oconomowoc.....	100	7	35

these roads would be under the same conditions that we had farther East.

The people whom we met were all extremely kind and courteous, with the single exception of a German farmer near Hammond, Ind., who absolutely refused to tell us our road, though he did suggest our going to I-1, and we hadn't even frightened his horses!

We made only one repair to the engine on the road. This was the replacing, near Milwaukee, of one of the small springs on the make and break of the sparking system, and took about one minute. The only other repairs during the entire trip were the resetting, on the second day, of the magnet, which was one tooth too far forward, and the smoothing of the pins on which the weights worked in the float feed carburetor; the taking up of some play in the steering wheel, twice replacing the aluminum mud guard under the flywheel, raising the rear mud guards and sending the two shoes to be recovered, and replacing four punctured tires.

As will be seen from the subjoined table, we traveled 1,218 miles, without counting some detours that were made because of broken bridges and losing our way, and we used 120 gallons of gasoline at a cost of \$24.

A total of 1,218 miles in 110 hours and 22 minutes. From this should be deducted the time lost in being towed out of trouble and in replacing the four punctured tires. Two of these punctures occurred on the inner side of the tubes, and so could not have been due to nails. My men thought they were caused by the heat (it turned hot west of Toledo) swelling the tires. Does this often happen?

Taken all in all, the trip was most enjoyable. We had from fair to good accommodations everywhere, and the only drawback was the horrible condition of the roads to Rochester, due to the long continued rains.

The Motor Horse, Ltd., has been registered in London with a capital stock of £100,000 to replace ordinary horses with motor horses.

The Official Automobile Blue Book for 1903.

The new edition of this valuable guide for tourists has recently been issued by the Official Automobile Blue Book Company, 31 West Forty-second street, New York. The book, which comprises about 400 pages, is bound in a soft leather cover and is of convenient size to be carried in any coat pocket.

Ten pages of the blue book are devoted to State and Federal laws and customs regulations. Attention is called to a bill which will be enacted into law by the next New Hampshire Legislature. The laws governing the use of automobiles on the highways of Vermont and New Jersey are printed in full. Should any of the State laws which are passed later on permit the local authorities to restrict automobile traffic, these restrictions will be published by the company in the form of special bulletins. Complete lists of the customs duties levied on automobiles imported into the United States or foreign countries as well as the United States customs regulations are published.

The greater part of the book is devoted to the important routes in the various "sections," of which there are twenty-seven in all. Running directions, towns en route, distance between towns, character and condition of roads and supply stations and their ratings are published in connection with each route. Even without a map any tourist should be able to find his way, provided he follows the "running directions." A complete list of storage, repair and supply stations and of "blue book" hotels is appended.

The automobile blue book is destined to become to the touring motorist what the Baedeker publications are to the European traveler.

We have so far not yet seen the usual estimate of how many millions of francs' worth of autos were sold as a result of the Paris-Madrid Race. Probably in this case it is more a question of how many prospective sales were lost by the race.

Notes on the Gordon Bennett Race — Deduced Results.

By J. S. V. BICKFORD.

I arrived at the Shelbourne Hotel, Dublin, early in the morning of July 1 and found the curse of Babel in great evidence, the hall being thronged by a crowd of all nations, French, German, English and Irish (the English variety) assailing one's ears from every side. After a perfectly futile attempt to find the gentleman to whom I should have reported and a hurried breakfast, I proceeded by train to the village of Naas, some 30 miles from Dublin, to see the cars weighed in.

The journey down was not conducted at any reckless speed, the average Irish train seeming to have plenty of time on its hands, but the extortion attempted by the Irish Jehu at the end of the trip was absolutely astounding, though in this particular instance the fares were not kind to the car driving brigands assembled outside the station, as the market square of Naas is well within walking distance of the station.

The little town of Naas is a typical Irish village of about one street, three banks and a public house dispensing some of the worst poison to be found on that side of the Irish Channel. Everywhere in the district are visible the remains of a vanished aristocracy—park gates lying in the grass and leading to a pile of crumbling ruins; unroofed houses, overgrown plantations and deserted mansions are met with at every turn, though the land seems well cared for and productive, but unfortunately it is almost all grazing land supporting but a meagre peasantry.

To return to Naas and the business of the day. The weighing of the cars had to be carried out in rather an improvised manner, there being no weighbridges obtainable of sufficient size to take in the cars. The difficulty was got over as follows: Two half ton weighing machines were placed facing one another, each being of the ordinary platform type familiar in most goods yards. Across the face of each machine was laid a steel girder channel upward, and at each end of these girders a short wooden ramp was arranged. The car to be weighed was then wheeled up the ramp and into the channels, the wheels being prevented from leaving the channels by the web. The car being balanced, each scale was read off by Mr. Lyons Sampson, the official "clerk of the scales," and recorded. The operation was attended by not a little delay on account of several cars weighing more than the limit.

OVERWEIGHT OF CARS.

Before it was possible to check the weights of the cars it became necessary to reduce 1,000 kilograms to hundredweights, quarters, pounds, into which the weighing machines were graduated, and the attempt to do this resulted in a very tolerable reproduction of the Tower of Babel episode. In the first place, it was some time before anyone could give with absolute certainty

the equivalent of 1 kilogram in pounds, and after that the resulting number of pounds, which was found to be 2,204.621, had to be reduced to hundredweights, etc., and, though I suppose there was no one present who could not have performed the operation with dispatch and certainty in his own study, on this occasion the calculation might have been a transit of Venus by the time it took; for everyone who had a note book and pencil was working it out and every calculator had as many kind advisers looking over his shoulder as space would admit of, each one offering criticism and suggestion on every figure put down, so that a man with a trace of nerves on him did not know at the end of five minutes whether he was doing arithmetic or an exercise in Sanscrit. Eventually, however, the mountain was delivered of its mouse, and the result was found to be 19 hundredweight, 2 quarters, 20.621 pounds for a car not having magneto ignition. If it were so fitted the weight might be increased by 7 kilos, or 15.430247 pounds, giving a last limit of 19 hundredweight, 3 quarters, 8.051247 pounds. The eventual weights were as given in the annexed table.

There was, however, some difficulty in bringing the weights down to these limits. The Mors reserve (numbered 6B), for instance, weighed a little over the limit and oil had to be started from the crank case and gear box before it could be brought under. The American cars easily came within the limit, except the Peerless, which had to have a few more fittings removed before it would come inside. The case of the two Panhards seemed hopeless at first, M. Farman's car weighing 20.0104, or over 30 pounds too much, while the Chevalier de Knyff's was nearly 20 pounds over, and after doing all that could be done apparently in the way of reducing weight. Eventually, however, they were brought down to the limit.

ACCURACY OF SCALES CHALLENGED.

The French contestants, when they failed to come within the limit, challenged the scales, one of the drivers saying that his car, which was 20 pounds over weight at Naas, was 16 pounds under in Paris. The Irish Constabulary official weights were therefore requisitioned and the scales tested, when it was found that, tried in precisely the same way as the cars had been, a half ton weight weighed within one-half pound, which might easily be accounted for by the gravel and dirt acquired by the twenty half hundredweight weights during the operation. The protester therefore apologized.

From the scales the cars were sent direct to a yard in the rear of the Town Hall, where Colonel Crompton was examining them to see that the rule which provided that exhaust pipes must be directed away from the ground was complied with and that all the parts were made in the country of origin. I heard that the Mercedes cars had

here to discard their Michelin tires in favor of some homemade articles (Continental), as the plea put forward that the small depot opened by Michelin in Germany constituted him a German maker was not allowed. With this exception all cars passed, and having had their voucher pouches and official numbers attached they were sent off to their garages.

TO KILDARE.

The next operation was to reach Kildare, where one of the controls was established and where the arrangements for the control were being rehearsed. There being no trains of any sort available, I had to make the best arrangements I could with one of the local brigands and eventually fixed up a price something lower than the value of the car and horse. The drive was nearly 12 miles and through a level country well cultivated, and seemingly quite prosperous from an agricultural point of view, though everywhere, as usual, were visible traces of a vanished aristocracy. The residents to whom I spoke are now in great hopes that the motor car will lead to the rebuilding of the country houses and increase generally the prosperity of rural Ireland. In this, I think, they are not likely to be disappointed, as the only thing against a residence in this and many other districts of Ireland is the total absence of reasonable facilities for communication. On the other hand, the roads are good and to a great extent deserted at ordinary times, so that speeds of between 30 and 40 miles per hour will probably be possible, which will bring even the remotest of these regions within quite a reasonable distance of centres of population. Apart from this question of communication there isn't an objection to the country from a residential point of view, for no more lovely country and no more kindly people exist on earth (so long as you are not their landlord!).

On the way to Kildare we passed one large place in complete ruins and I asked my driver what it was. He told me it had never been finished, as the local squire who had started to build it had met with the misfortune to have his head cut off for conspiracy before he could get through with the job; the place certainly looked old enough for the story to be true, though I suppose the last conspiracy of the sort would have been the 1745 rebellion in favor of the Young Pretender.

After about an hour and a half's drive we arrived at Kildare, having been passed on the way by between twenty and thirty motor cars, to say nothing of overraking and being overtaken by cyclists and horse cars with drivers and riders, both drunk and sober (mostly the former), without number. I was pleased to see that both the horse I was behind then and all the others I patronized in Ireland took no notice whatever of a motor car passing at 30 miles per hour, though one of them shed conscientiously at every felled tree on the route.

I may say that the crowd of automobiles

in this part of Ireland was a revelation to me. I have always been of the opinion that to pass a horse at over 20 miles per hour in an automobile was criminal on the part of the driver, and if it is not certain that the horse will not shy it is so, but when in process of time horses are as accustomed to cars as they are to wheels now, I believe it will be possible to exceed with perfect safety speeds which are now considered (and rightly so) dangerous. In the whole course of my visit to Ireland I never saw so much as the chance of an accident due to motor cars, though I saw three and was in one horse accident. One of the reasons for the immunity of the district from accidents was that everyone knew that there were numbers of high speed cars about, and in consequence the high road was not used as a farmyard and playground combined, everyone keeping well off it, and people coming from side roads into the main road did so with reasonable care, and not as if they were the last inhabitants of the earth.

On arriving in Kildare I examined the method of working the controls, which I will now proceed to describe.

THE TIMING ARRANGEMENTS.

Mr. Phillips was in complete charge of these throughout, and he may be complimented on the thoroughness of the arrangements.

In the first place there were two large 9 inch dial clocks, with centre seconds hands beating fifth of a second, at the entrance and exit of each control. These were not used in the official timing, but were provided with a view to giving the competitors and the public congregated in sight of them some idea of the correctness of the timing. The advantage to the press and public was not considerable, and the clocks did not appear to synchronize well. The actual timing arrangements were as follows:

At the starting point were three official chronographs with split seconds arrangement. For the benefit of those who do not know what the split seconds chronograph is it may be shortly described. On pressing the winder of the watch two seconds hands start from their point of rest at zero (12 o'clock) and beat fifth of seconds in the ordinary way, a sixty minute recorder starting simultaneously, the minute hand being generally so arranged that it does not move at all till the seconds hand passes the sixty seconds mark, when the minute hand moves on, one minute at a jump. By this system it is easy to read minutes and seconds. Under the seconds hand is another hand which moves with the seconds hand and is normally completely covered by it; on pressing a second knob on the side of the watch this underlying hand is stopped, while a second pressure on the same knob results in this auxiliary hand flying back to join the seconds hand *wherever the latter may be!* The utility of this arrangement in timing a race will be obvious on a moment's thought.

The watch is used as follows: On the firing of the starting pistol the holder of the watch starts up the chronograph (both seconds hands at once), and in order to time the laps in, for instance, a cycle race he would press the second knob. This would enable him to read, to a fifth of a second, where the ordinary seconds hand was at the moment of the completion of the lap; as soon as he has read off the reading of the watch at this point he presses the split seconds knob again and sends the split seconds hand to join the seconds hand. In other words, the split seconds hand is an arrangement to enable the watch holder to determine with accuracy the position of the seconds hand without stopping it.

In the Gordon Bennett race the use of the watch was as follows: At the firing of the pistol three chronographs were started up all together with one specially arranged trigger, all three watches being in a wooden box specially arranged. At the starting of the second car the time was "split," i. e., the split seconds hand was stopped and the time read off. This should in all cases be exactly seven minutes after the preceding car, and as a matter of fact it never differed from it by more than one-fifth of a second. On the completion of each round the time was again split and recorded. The official timekeeper was assisted and checked by the official timekeeper of the Automobile Club of France.

TIMING AT CONTROLS.

The arrangements at the controls will now be described. It was first intended to use two split seconds chronographs at each control, one at the inlet and the other at the outlet, and to split the time on a car entering by one watch and by the other on its leaving; this would have required fourteen chronographs. It was found, however, that it was physically impossible to get the necessary number of watches to synchronize at the end of the long run and it was therefore decided to use a watch for every car at every control. This necessitated no less than eighty-four chronographs, which were lent for the purpose by the makers.

On the entry of a car into a control, which was officially supposed to take place when it was brought to a state of rest between two marks on the road, one of the chronographs was started and was then placed in a locked box and handed to a cyclist. This cyclist proceeded at a good pace to the outward end of the control, followed by the car, where the watch was handed, box and all, to the starter. This official took out the watch and told the driver what time he had to stay and recorded the time allowed in the control on the vouchers carried in the voucher pouches on the car. These were then returned to the pouches and at the expiration of the time the car received the word to go and the watch was stopped. The watch was then returned to the head marshal of the control, who also recorded the time and

returned the seconds hand of the watch to zero.

It was also provided that if any two cars arrived at a control within two minutes of each other the second arrival was to be detained two minutes beyond the allotted time for that control. By this means it was hoped that passing on the road would be to some extent obviated. Of course this arrangement made it quite impossible to determine which car was leading after the end of the first round until the control returns were received, but it was certainly conducive to safety.

In addition to these official timing arrangements, which have to do with the actual timing of the race itself, there was provided an electric timing apparatus which timed the speed over one mile of straight road at the start and finish (the start and finish were at the same point).

THE ARRANGEMENT OF THE COURSE.

As is generally known, the course is roughly a square with one diagonal, the diagonal being approximately north and south. The start was at a point in the diagonal toward the north and the first round was toward the east, being the shorter of the two, while the second was the western, or larger circuit.

The policing of the course was in the hands of the Irish constabulary, of whom about 7,000 were employed, or roughly eighty per mile. The arrangements were thoroughly well organized, and as far as I could see no one other than officials went on to the course.

The Automobile Club had an enclosure at the start and finish, while a grand stand had been erected astride of the road bridgewise.

The only objection to the starting point at Ballyshannon was that it was about 6 Irish miles from the nearest station, which gave full rein to the money extracting powers of the Irish driver. The entrance to the club enclosure was well down the road from the stand at Ballyshannon House. This is another of the deserted houses of Ireland—a house which must have been very fine in its day and opening at the rear on to what were once ornamental ponds and gardens, of which today the only trace is a stagnant marsh and a single ornamental iron arch standing erect in a wilderness of weeds. Good accommodation for cars and a big stock of gasoline were provided here, while the forethought of someone had provided one small basin and a smaller jug of water for the ablutions of the 500 or 600 gentlemen who attended the race. Considering that the great majority of the visitors arrived with their faces absolutely unrecognizable from the thick dust which covered them, the supply could hardly be considered extravagant.

GRAND STANDS NOT PROFITABLE.

Grand stands had been erected at several points on the course, and I am afraid from what I hear that many of the builders must have lost money. One unfortunate I heard had built a stand for 2,000, sold twelve seats

and then the board of works condemned the stand as unsafe. On the whole, the visitors were not as numerous as was expected. Probably the distance from a large centre of population militated against a large crowd, and possibly it was as well, all things considered.

The course itself was, I hear, fairly good, all things considered, but it had some very nasty points. One of the worst features, to those not accustomed to it, are the ridges formed across the roads by drains and small bridges. I have some personal experience of these, and even at 30 miles per hour the car is apt to leave the road completely in passing one of these points. Something had been done by erecting flags and oiling the road at the worst corners, but after everything had been done that forethought could suggest there were many dangerous points in the course. At no point was the road too broad and in many points the macadam itself did not exceed about 15 feet. After seeing the cars pass the grand stand it seemed to a spectator that nothing short of a miracle could prevent an accident if two cars tried to pass on the road.

TO THE COURSE FROM DUBLIN.

The race started at 7 a. m., while all traffic on the course was stopped at 6, so that it became necessary to start very early in order to arrive in time. Most of the officials who were not going by car were taken to their posts by a train, leaving Dublin at 3 a. m., and driven to their posts by horse cars. I had intended to leave by the 3:30 train for Kildare and came down in time to get a hasty breakfast and catch it. I was, however, fortunate enough to meet a friend who introduced me to a friend of his driving a Lanchester car, who was good enough to take me out.

We boarded our car and left the Shelbourne Hotel at 3:40 a. m., the day just breaking fine and warm. After a moment's stop at the Maplin Hotel, to allow my friend to change a rubber coat for a light overcoat, we proceeded out of Dublin, which was practically deserted of both horse and pedestrian traffic, at a speed which left nothing to be desired from a time saving point of view.

We overtook and passed on the way, I should say, about thirty-five automobiles and cyclists by the hundred. The police appeared to have arranged to give free play to all cars on this day, and no one took the slightest notice of our speed. As long as the road was clear in front of us our car seemed content with moderation as represented by 35 miles per hour, but the moment she caught the smell of another car's dust in advance the engine accelerated, and away we went like the wind.

About half way out we received a check in the form of a squeak in the engine, and after traveling on the second speed for some miles, to give the engine a chance to cool off, without effect, we pulled up in a friendly back water and oiled up our en-

gine till she was reduced to silence once more. During this time five of the cars we had passed passed us again.

After putting matters right we passed the last village on the route and the sun rose full behind us, lighting up a straight stretch of some miles, along which we simply flew to make up for lost time. About this time the writer had his first experience of one of the raised ridges across the road, and did not at all relish it. The first thing he knew was he was about 18 inches in the air with the car falling away from under him. This is no exaggeration whatever. These ridges are very steep, and a car taking them at anything but the most moderate pace will completely leave the road. After this we kept a good lookout for them and held on with both hands.

At last we arrived at the Ballyshannon House and stabled our car in the yard, after which we removed the outer crust of dirt and dust from our faces and proceeded to the course. We had covered the 37 miles or so from Dublin in roughly 1.5 hrs. running time, and I think I may safely say without danger or chance of danger to any other user of the road.

THE RACE.

The official commencement of the day's proceedings took place at 6 a. m., when the road was closed to all traffic. At this hour a high power car with an inspecting official started round the course. This car was treated at all controls in every respect as a racing car, the procedure being gone through to the smallest details, and, as far as I know, everything was correct.

At 6:30 two pilot cars started round the course by the two different routes. One of these was the Wolseley racer, which failed to enter in time for the actual eliminating race, but was built for the Gordon Bennett race itself. This car appeared to have a very fair turn of speed, and returned well ahead of the first car, which it preceded by about half an hour. On the other hand, it was not held up at controls, so that it was not possible to judge the speed by timing it.

At five minutes to 7, Irish time, S. F. Edge, the holder of the cup, took (or, to be exact, wheeled) the mark on his Napier racer. At three minutes to 7, two minutes and one minute, the starter notified the time to the driver, the same procedure taking place in the case of each car. At two minutes to the hour the engine was started, and set to work with a noise that conveyed an idea of a dynamite explosion. After the expiration of the last minute but one the time starter called: "Thirty seconds more," "twenty seconds more," "ten seconds," "five," "four," "three," "two," "one," "go!"—and the Napier jumped into her stride at a bound, thundering under the grand stand, and was out of sight in a flash in a cloud of dust.

At intervals of seven minutes the rest of the cars were officially started, though Mr. Winton was so unfortunate as to be troubled with a choked carburetor.

OBSERVATIONS ON CONSTRUCTION.

The arrangement of the Peerless engine was admired for simplicity and strength. This car had a wire net bonnet over the engine, with which I was rather struck, as it seemed to me that at the terrific speeds at which these cars travel the cooling effect of the wind could not be negligible.

Some of the cars were provided with rubber buffers under the springs to prevent too great a strain falling on the springs at bad pieces of the road. In addition to this a strap was in some cases so arranged as to prevent the spring from opening too far on the rebound. A carriage builder in this neighborhood told me that it was never the compression which broke the spring, but the expansion, due to the rebound which, as will at once be seen on inspecting a carriage spring, comes all on one plate.

I was more especially struck with the smallness of the arms connecting the steering handle with the front wheels. At a guess I should say that these did not exceed five-eighths inch at the ends, which cannot be considered excessive, considering the terrific strains which one would expect to fall on this gear.

The majority of the mechanics had straps behind the driver's backs into which they twined their right hands, and after seeing a car pass at full speed one could understand the necessity. The mechanic of the Winton adopted another method. He sat in the seat and leaned forward, so as to hold on to the dashboard. The position seems very tiring and would also appear to cut a good deal of wind.

Foxhall Keene was successfully dispatched on the last car at 8:17 a. m. and then everyone except those directly concerned with the timing was sent off the road. This was none too soon, moreover, for in ten minutes the cry was raised that a car was coming, and Mr. Edge passed at 66 miles per hour, having completed the first round in 1 hr. 23 m. 25 s. After this those of the spectators who had timed the starts with split seconds chronographs had the only bit of actual racing to watch for the day, for it might be safely inferred that the times at the controls would not have been different for the different cars on this, the first round, whereas after this round it would be certain that some additional time would have to be allowed in some of the stops.

As the seven minutes approached and Chevallier de Kniff's Panhard did not show up matters became more and more interesting. Thirty seconds to the time and still no car in sight. Twenty seconds. Ten seconds. Five seconds. Time up. Edge has gained on the second car. No. 1 Panhard, which eventually passed over three minutes late. Then followed another interval of four minutes, and we began to look for the return of Mr. Owen's Winton. Minutes passed and it did not show up till nearly fourteen minutes had elapsed since the No. 1 Panhard had passed, when a fly-

was raised that two cars were coming almost abreast. Excitement ran high to know whether they would turn out to be Jenatzy overtaken by Jarrott, the Winton broken down, or Owen overhauled by Jenatzy. The latter proved to be the case and the two cars thundered past the stand within three-fifths of a second of one another.

On the second round the first car to arrive was the No. 2 Panhard (Chevalier de Knyff), who had passed Edge's car punctured. This effectually disposed of England's chance of winning the trophy, as Jarrott, the only other car, broke down hopelessly. The steering gear appears to have given way and the car, after striking an obstruction of some sort, broke in two. Mr. Jarrott, though having a broken collar bone, managed to pull his mechanician, badly bruised, from under the car and then drag it out of the course before he collapsed. If this is really true it is an extremely plucky feat. The first report was that he was killed and a gloom overspread the whole enclosure, when the Baron de Caters did a very sporting thing. He came down for the second round 55 miles per hour, stopped dead at the starting point long enough to say, "Jarrott not hurt," and then threw his gear into the fourth notch apparently and was off with a jerk that sent the gravel flying and plowed two long furrows in the road. It was a thoughtful and sporting action, which was very fully appreciated. Every time he passed under the grand stand the baron looked up and nodded to the baroness, who occupied a seat directly over the road. This, coupled with his sporting action about Jarrott, soon raised him to a first class favorite.

Edge's time for the first two rounds was 3h. 25m., as compared with 2h. 58m. 17s. for Jenatzy and 2h. 50m. 16s. for Chevalier de Knyff. It was noted that as Edge passed for the second time his radiator was steaming like a locomotive, indicating insufficient cooling surface. These cars have a large amount of heat to get rid of. They are probably using not less than 30 pounds of fuel per hour and half the heat of this is going in the cooling water, so that 300,000 units of heat have to be disposed of. My

own experiments on cooling in a stiff breeze indicate a cooling effect of 2,000 units could be disposed of, so that it would seem that to completely retain the water something like 100 square feet of surface would be required, giving in a Mercedes cellular radiator with 6 inch long tubes three-eighth inch square 1,600 tubes, tube plate 20 inches square, which is not far off from what is provided.

THE RETURN HOME.

I came home from Kildare station to Dublin and straight to Cambarne through London, making twenty-six hours of traveling, and on this journey had the only accident of the trip, and that due to what may be described as "the injudicious use of alcohol in an internal combustion engine, designed by nature to use other fuel." It was while going to the North Wall station by an Irish jaunting car that the mishap occurred. The Irish car, it may be explained, is a two wheeled vehicle in which the passengers sit facing the side of the road and back to back, immediately over the wheels. That is to say, you travel sideways as in a wagonette, but instead of facing inward you face outward. The result is a narrow wheel gauge and a none too safe car, but it has the advantage of being easy to get out of in a hurry. I hailed the first one handy, which, when it approached, proved to be driven by a veteran with his head swathed in bandages, and when we had started he turned out to be alcoholized into the bargain. Down the first hill he lashed his horse into as wild a gallop as it was capable of and turned round to admire the view. At this moment car No. 2 turned a sharp corner, across our bow, so to speak, and though my Jehu saw him all right he simply observed, "Shure, he's crossing me full," and went on till we were within a distance where no saving of the collision was possible, when he attempted to pull up, failed and rammed the opposing steed fair in the ribs, knocking it sprawling in the street. At this he picked up his reins and drove off for dear life,

demanding my name as a witness in the trial likely to ensue.

OFFICIAL WEIGHTS AND TIMES.

Order of Start	Driver.	Weight of Car in Pounds	Time of first round (trotting)	Time of second round (trotting)
1	Edge.....	2176.75	1:23.05	2:00.05
2	De Knyff...	2219.25	1:26.49	2:30.16
3	Owen.....	1925.5	1:33.54	2:30.17
4	Jenatzy...	2203	1:27.00	2:30.17
5	Jarrott.....	2204	1:35.14	.....
6	Gabriel....	2115.75	1:30.11	2:00.00
7	Moore.....	2150.25	2:09.11	.....
8	De Caters...	2180.5	1:29.18	2:00.00
9	Stocks.....	2167.25	.....	.....
10	Parman....	2215.75	1:34.21	2:45.50
11	Winton....	2150.25	2:13.29	.....
12	Keene.....	2215	1:23.5	2:07.11

The Story of the Chicago-Mammoth Cave Club Tour.

By DR. FRANK H. DAVIS.

While the wind howled and the snow-flakes chased each other merrily on the lake front last winter, a party of Chicago automobilists sitting before the cheery grate fires, in the spacious parlors of their local club, centred their conversation on the subject of touring. It was decided that this should be the banner year of the club's existence, and that pressure should be brought to bear on the runs and tours committee to come forth with suitable proposals. The committee went into session, and when they emerged from the "blue haze" a book of runs and tours was presented. The haze had been so deep over their plans that they had serenely mapped out a 1,500 mile tour to Mammoth Cave, Kentucky.

"Well," said the club, "after all it might not be impossible"; and upon still further meditation, "say, that is ideal; we will surely break away from this everlasting hindrance of business and take that in—yes we will surely go; it's set (fortunately) a long time ahead, and we can make our plans accordingly—we will go."

By this time the committee began to believe in it themselves, and said this must go now. So, with the aid of a high salaried attorney, an ironclad agreement or



REPLACING A TIRE.



FERRYING ACROSS THE GREEN RIVER.



KENTUCKY MOUNTAIN SCENE.



AT BARDSTOWN.

compact, was drawn up, to the effect that the signer bind himself to go or forfeit all his earthly belongings, his citizenship, in fact his very club membership. And like the farmer in Will Carleton's lightning rod story they (sixty-six) signed it.

The month of brides and roses was ushered in in all its glory. The rain ceased, the skies were blue. Committees from different automobile clubs of the cities through which we were to pass wrote, telegraphed and bade us cordial welcome to their cities.

The signers stood firm—we will go, said they. June 1 came; more committees, more letters of inquiry. We will go, lisped the signers, as far as we can, but lo! only a remnant spoke now, for the body had fled. And then, with glittering brass, clattering of flags, bappy but doubtful faces, and the merry goodspeed of less bold friends, thirty-six people, in all makes and styles of machines, drew slowly southward, with Cedar Lake, Ind., 30 miles away, for the first objective point, where in the evening a grand reception and ball to which the general automobile public had been invited, was to be given.

Stop now and think what it means to plan in detail such a tour. How many will actually go? How far will they want to go in a day? What is the best route for each day? What the condition of the road? How long would such a number be delayed each day by accidents? What kind of hotels will we find at the end of each day, fit for tired but happy mortals, etc.? These questions must be solved (or guessed at) by the answers to a thousand letters of inquiry to local automobilists, liverymen and even postmasters along the proposed route.

Cedar Lake was reached with some little sand difficulties. It seemed to me a fairly good road, and a merry party we were, but somehow many seemed to weaken—they began to discuss what might happen should they get farther from home. In most cases the machines stood up well, but the drivers lost courage, in spite of the fact that a great many club delegates in a touring car were waiting to escort us to their home club in Indianapolis. Many faint hearts turned

back, and when the "great Chicago party" lined up for the further trip we found all out but three touring cars, a Winton, occupied by A. Scott Ormsby and wife, Dr. Frank H. Davis and C. Trip; a Darracq, carrying J. B. Burdette and wife and C. E. Stevens and wife, and a Toledo, with I. M. Smith, wife and son.

Lafayette was reached after some more difficulties, as the sand was deep in places and required more power than Mr. Smith's car could show. The French car, being narrow tread, also required the combined strength of the "bunch" to lift it up the hills. Then, at a most trying time, the battery gave out on the Toledo. Later on the pump chain got lost and you could light a cigar in the engine before it quit, thereby showing the trouble. Then a tire became tired and laid down to rest, all of which delayed the game, but willing hands set all things right and we were happy until the French car's clutch began to slip; but agile Burdette soon put it right alone and didn't call for help until a puncture was recorded and a new inner tube required.

At Lafayette a company of about thirty more members of the Indianapolis Automobile Club, including Mayor Bookwalter, had arrived to greet us and bear us on. Wealthy, beautiful little Lafayette opened her large club to us—she is not yet the proud possessor of an automobile club—and gave us the best in the land. Next morning on to Indianapolis we went, fifty strong, and a merry, jolly party it was. Our course was smooth, but tortuous, and we had to run 115 miles to advance 72 as the crow flies. The natives had learned of the coming of the "devil wagons" and turned out in gala attire, lining the roads and swarming the town to "see 'em." Only one dangerous appearing accident occurred that day, the first machine scaring a team of mules attached to a wheel cultivator. They were in the road, headed toward the following automobilists, who were some little distance behind the pace maker, and started on a mad dead run toward us. However, one of the gentlemen of the imperilled party succeeded in turning them into the fence until he could grasp the bridle.

Nothing further of note occurred, except the bursting of tires. Tires, tires—why can they not be made stronger? Fortunately we had two or three casings and as many inner tubes and were therefore not delayed long. However, just as we were about to enter Indianapolis in state another French tire burst and, Mr. Burdette being unable to get another, we were delayed for two days in that city while a rubber tire company repaired it, but it gave us a chance to see Indianapolis thoroughly—and it is well worth the time.

Charles W. Gray, president of the C. A. C., had been one of the most enthusiastic signers of the touring agreement, and his non-appearance at the start had been a great surprise; now, only a few hours late, his Peerless car dashed up to the hotel, and he, with Mrs. Gray, their two boys and his chauffeur, alighted, covered with dust, having gained nearly a day in an almost straight-away run from Chicago, having left more than a day behind us, on account of urgent business. We were now a party of fifteen, having also been joined by J. Walter Scott and wife (Northern).

Escorted by a delegation from Richmond and with club colors flying, we sped along over a most beautiful road, and arrived on time, with no accident except the bursting of a bad tire casing on the Winton. During the next day's run to Cincinnati there was quite a number of incidents, however, as another tire case burst on the Winton, two inner tubes had to be replaced on Gray's Peerless, one on Burdette's Darracq, and the gasoline tank sprung a leak on the Northern.

We had been informed at home that there would be no chance for automobiling in Cincinnati, on account of the steep hills, so, having arrived at noon and being compelled to wait over until the next day, while Burdette could get a new casing from New York, Gray, with five people in his Peerless, started out with a guide to "see." We found some rather steep hills, but mounted them so easily that we asked for something harder. We found it in a street so steep that all traffic had been abandoned there. The cobblestone paving was in very bad

shape, some of the cobbles having rolled to the bottom, and we were amazed to find that the car climbed it without a halt. At the top some photos were taken.

The next day's run to Lexington was through the most beautiful scenery I have ever witnessed from an automobile. As the crow flies the distance is 89 miles, but as the road goes (by cyclometer) it is 135. We arrived at our hotel at 5:30 p. m., after a half dozen stops for replacing inner tubes and casings. We did not encounter a single hill that was not easily taken, nor have an accident of any kind to any other part of any car. So far no runaway or serious horse accident of any kind had occurred.

Lexington is another city of hills, and the smooth and somewhat level pikes on toward High Bridge reminded us of "old Illinois." For a short time only, however,

graphed, and in consequence arrived at Bardstown twenty-four hours still further behind the schedule.

The next morning found us starting on the last lap of the tour (99 miles by cyclometer). As we had been informed beforehand that at least 50 miles of the road was impassable, we had our courage screwed up to the last notch. We were now but a party of two cars—Ormsby's Winton and Gray's Peerless—all others having dropped out at different points along the road. This road passes through a desolate, barren part of the country, full of steep hills, huge rocks and red worthless sand—an ideal spot for the numerous illicit stills which, according to the best authority, always exist here. The country is almost pauperized and cannot afford to repair this road, which was at one period

We arrived at Mammoth Cave Hotel at 10 p. m., having stopped two hours en route for meals, which had to be borrowed and cooked while we waited, and having gone 10 miles out of our way at the start by the misdirection of a native. The performance of the cars on this trip entirely convinced us that the automobile has passed the "toy" period and is a vehicle sturdy, staunch and entirely dependable for trips of pleasure or business. It affords an easy, graceful and intensely interesting mode of travel, and especially so to the lover of nature and overworked business man, instantly and completely banishing all care and affording such boyish delights as a "river swim" or "one old cat."

Mammoth Cave, the wonderful, is the same yesterday, today and forever, the grandest of awe inspiring works of nature.



A TOLL GATE ON THE KENTUCKY RIVER.



FIRST AUTOS AT THE MAMMOTH CAVE HOTEL
BETWEEN DANVILLE AND BARDSTOWN.

for then the Kentucky River Valley burst upon us with an awe inspiring scenic splendor. I have ridden horseback through the Rockies, bicycled in the Adirondacks and climbed in the Alps, but never have I seen a grander sight than when we approached this valley by the winding white roads curving from cliff to cliff through dense foliage, then suddenly emerging in the open.

At Danville an inner tube of the Winton car exploded while turning a corner, causing the car to swing into a telegraph pole, seriously bending both the rear axle and frame. We were able, however, to get the car to a nearby blacksmith's shop, and although the smith had never before seen a touring car, and although the entire axle truss had to be removed, by our aid and instruction he was able to repair the damage within a few hours. We also were delayed by tires for which we had tele-

before the war a noted turnpike, well graded and built of large, irregular, natural stone, and filled in with smaller ones and sand, but through long disuse, wash-outs, and it would seem human attempts to wreck it—everybody ordinarily travels horseback—the road is certainly the opposite of the automobilist's ideal, and how we got over it absolutely without accident would be difficult to comprehend if I could accurately describe its awfulness. Blisters on the hands of the chauffeurs at the end of the day from the vigorous, constant manipulation of brakes and clutch speak more than volumes of verbal description. The natives here are the "poor white trash," living in dense ignorance and poverty, with large, shifty eyes that look at you in malice or wonder from a point of vantage on a rock or tree, or boldly from the roadside.

Indescribable and well worth the effort of the trip (were there no other incentive). Echo River—forever will I hear that echo. Truly, the world is great and the work of the Master supreme. Why do people live on and on, content with the stuffy odors and stiff unnaturalness of a great city, or for a "change" go to the fashionable watering places where unnaturalness is even more pronounced, when nature in her beauty is thus so complete?

The countryside for miles about the Mammoth Cave seemed to know instantly of our arrival and flocked in, surrounding our machines, viewing them in wonder and amazement.

At the Cave we learned that by making a 40 mile detour to the south we would find a more level country and somewhat better roads. So, after a glorious day at the Cave, we made a start at 6 a. m. with the inten-

tion of making a two days' schedule run and reaching Louisville in the evening. During this day's run we were informed by a number of natives, mostly colored, that touring cars had never before passed through that region. We arrived at Bardstown for supper, without incident, except some trouble with one of the intake valves on the Peerless, which had to be replaced with a new one, carried with the spare parts. A mishap also occurred to one of the steering knuckles of this car. In trying to avoid a deep hole in the road, a loose stone caught the front wheel and turned it sharply into a tree, bending the knuckle to such an extent that it had to be straightened on a stone before we could proceed.

At Bardstown a champagne supper was given us, which delayed us for three hours, but at 10 p. m. we left the city, over a most beautiful road. Now, strange to be related, that although during the entire 250 miles' trip from Bardstown to the Cave and back, over the roughest, sharp rock road imaginable, and part of the way over dried river bottom of stone piles—a trip the natives strongly advised against and offered bets of three to one that we could not make—the tires gave us absolutely no trouble, yet on this smooth turnpike an outer casing exploded without warning, and within fifteen minutes after the repair had been made, and while we were sailing serenely onward again, an inner tube of another tire exploded. Then the big French acetylene lamps refused to work and we were again delayed.

Our troubles being over, and being exhausted from the jolts and strenuous work of a long day's trip—the champagne had nothing to do with it—everybody fell asleep, including the "men at the wheel," who only kept the car in the centre of the broad, white road by sheer instinct and occasional periods of consciousness, caused by the slowing down of the Winton, owing to the throttle spring forcing up the foot button, which was now relaxed, the car thereby slowing down of itself, as if to join us in our dreamy siesta. This was a queer experience and a queer sensation. The scenery in these quiet, moonlit, shimmering valleys and hills was indescribable in its loveliness, and must be seen to be appreciated. The broad white ribbon road, unfurling forever with new scenes, seemed to end at the top of each hill, until we approached, when it laughingly beckoned us on as it darted ahead into the moonlight.

Dust begrimed and weary we arrived at our hotel at 3 o'clock a. m., and glad we were to see it. The bewellied night clerk of the splendid hostelry "gazed upon us with a stony stare." "We have nothing," said he. As the ladies of the party appeared, a new light seemed to dawn upon him, and he said: "Wait—aren't you automobilists?—I thought—I thought—I don't know but that we have a few rooms left—yes, I'm sure we have—O yes, we are glad to see you." That morning at 10 a. m. we were up again and spent until 3 p. m. in seeing Louisville, when we again "took to the road."

We had "listed" the road as being anything but good driving for about half way to Indianapolis, from the best information we could get, and we therefore decided to drive as far into the country as opportunity offered, trusting to luck to find a suitable lodging place. We succeeded in penetrating as far as Sottsburg, where we found a very cosy little hotel with large, airy, clean rooms and good meals.

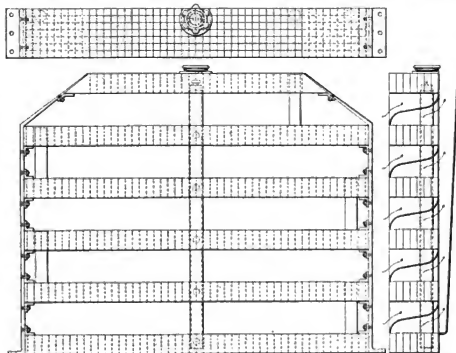
The next day we easily drove to Logansport, thus cutting another day from the schedule, and were surprised to find the roads very good. We stopped over at Indianapolis long enough for some slight adjustment to the cars and to take on gasoline and lubricating oil, and incidentally to pick up Mr. Burdette's party, which had taken the train from Bardstown to the Cave and returned in time to get their car and proceed leisurely to this point. No other incidents

NEW VEHICLES AND PARTS.

The Desberon Cellular Cooler.

The Desberon water cooler, which we illustrate, is a new product of the Desberon Motor Car Company, of Twelfth avenue and Fifty-first street, New York, manufactured after the designs of F. C. Stinzinger, the company's superintendent. Various sizes will be made to conform to the specifications and requirements of automobile builders.

In the illustration the cooler is shown in front and side elevations, and also in a plan view. There are six tiers of tubes, which are bolted to metal plates at either end. Each tier is built up by soldering square tubes of thin copper together. To create water ducts between the tubes before soldering wires are placed so that they are



DESBERON CELLULAR COOLER.

occurred, except the bursting of two outer casings on the Winton.

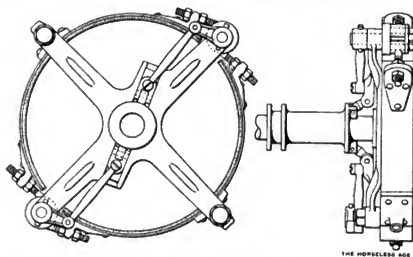
On Friday we drove to Laporte, Ind., 135 miles, starting at 10 a. m. and arriving at 6 p. m. We made several stops for lemonade, etc., and had an hour's lay over at South Bend. At the latter place we were overtaken by a rainstorm and then our "coverall" rain aprons came in very handy. The only trouble experienced was short circuiting of the batteries by the splashing mud and water, but this was later remedied by hanging rubber aprons under the car.

On Saturday we arrived in Chicago at noon and found a most beautiful dinner awaiting us at the club, and a host of members to welcome us. All were glad, of course, to get home again, but not one in the party who did not express a willingness to begin it again at once would time and opportunity permit. I can recommend this tour as the cream of automobilizing.

kept apart and properly spaced. In the side elevation the curved plates between the tiers are shown. These plates deflect the air currents, when the machine is in motion, so that a draft is created in all the tubes. The courses of these currents of air are indicated by the arrows.

To fill the cooler the filling cap is removed and the water is poured in. The upper row of tubes will fill first. As soon as the liquid reaches the level of the pipe communicating with the second row, the water will flow into it, etc., until the cooler and the entire circulating system are full. No fan is used to increase the draft, the manufacturers holding that whenever the car is at a standstill and the motor is running the air will rise through the tubes, whereas if the tubes were placed horizontally a fan would be necessary to create a current of air through them.

Should one of the rows be injured or de-



UPTON'S FRICTION CLUTCH.

stroyed in a collision it is possible to effect repairs by removing a section and replacing it by another. Most of the foreign made honeycomb coolers are beyond repair once they become indented. In the apparatus shown there are approximately 1,800 tubes, which afford a very large radiating surface.

The Upton External Band Clutch.

The Upton Gear Company, of 144 West Thirty-ninth street, New York, proposes to engage in the manufacture of friction clutches of the design shown in the accompanying illustration. This clutch is intended for use in connection with machines that are equipped with variable speed gears of the clash gear and individual clutch types. The driving member may be either the fly-wheel or any suitable disk that is mounted on and secured to the crank shaft.

The clutch comprises two bands of steel, to which leather has been riveted; a spider of cast metal and means for causing the

clutch bands to bear. Each band covers very little less than one-half of the drum and is actuated by a rod (at either end) which pulls on its respective ear. There are in all four ears, which are secured to the bands by means of rivets. The four threaded rods have at one end an eye, through which a pin passes. The pins are rocked by a disk, to which they are secured. At the other end of the shafts, which are integral with the disks, are short levers connected up to the crossheads by links. A sliding sleeve is provided to control the action of the toggles. When the sleeve is thrust toward the clutch the toggles force the crossheads apart and engage the clutch. To relieve it the sleeve must be moved in the opposite direction.

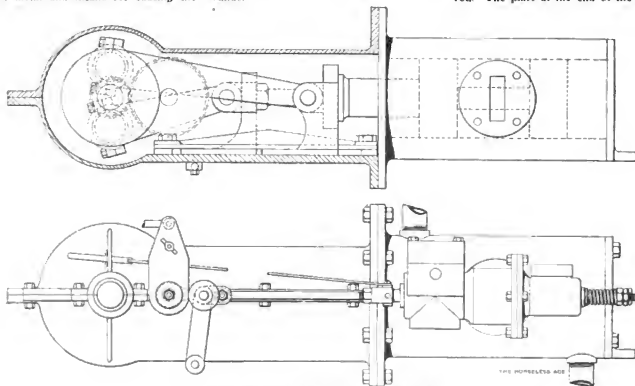
The manufacturers claim that this clutch will not drag when relieved, that it is positive in its action and that provision is made for a wide range of adjustment of the bands.

The Twelve Horse Power "Binate" Kerosene Motor.

In a former issue of THE HORSELESS AGE a brief description of the "Binate" motor of R. W. Coffee & Son, of Richmond, Va., was given. At that time the engines built by this concern were intended for gasoline fuel, but it has since been discovered that the motor can be operated successfully by means of kerosene.

In the United States there is only one other maker of automobile motors, to our knowledge, who employs two pistons which work in the same cylinder. Gobron et Brillié, in France, have built such engines for years, but unlike the "Binate" motor, the piston which actuates two connecting rods has exposed mechanism. In the illustration the pistons, crossheads and connecting rods are shown. The piston which adjoins the cover at the end of the cylinder is equipped with a piston rod that passes through the other piston and its rod, which is, of course, hollow. The former rod and also the piston are fitted with piston rings to prevent leakage of gas. The hollow piston rod is provided with a yoke which is cast integral with the crossheads to which the two long connecting rods are secured. There is only a single connecting rod between the other crosshead and the corresponding crank pin. The construction calls for three individual crank pins. Although the crank shaft requires at least two main bearings, four bearings are provided.

The bore of this engine, which is rated at 12 horse power, is 6 inches and the stroke is equivalent to 9, as each piston travels $4\frac{1}{2}$ inches. The free area of the pistons is equal to the area of the cylinder bore minus the area of the smaller piston rod. The plate at the end of the cylinder



TWO SIDE ELEVATIONS OF THE "BINATE" MOTOR.

serves as a bracket to support that end of the motor and cannot be regarded as a head. Only a single pair of port valves are employed, both of the horizontal type. The valve chamber is bolted onto the side of the cylinder, which is water jacketed.

Ignition is by jump spark without a trembler. The makers hold that one hot spark is more satisfactory than a shower of sparks generated in the usual way. To protect all the reciprocating parts the frame is entirely enclosed like the crank case of a vertical motor. Owing to this arrangement of the reciprocating parts and to the fact that the pistons, while in motion, move in opposite directions, the engine is practically balanced at all times, no matter at what rate of speed it may be running.

In the presence of a representative of THE HORSELESS AGE a demonstration was made in the Tremont section of New York city with a touring car of 2,500 pounds, equipped with an engine of this size and make. A few drops of alcohol were drawn into the cylinder with the air to start the motor and generate the kerosene vapor. Combustion seemed to be practically perfect, as no offensive odor or smoke was noticed. The motor responded to the spark timing and throttle levers, and seemed to be as flexible as any engine of its rating propelling a vehicle of the weight mentioned could be expected to be. A grade of about 12 per cent. was negotiated on the low speed from a standing start, the engine gaining speed gradually all the way up.

There is nothing about the carburetor, judging by its appearance, that would characterize it as a gas generator intended for kerosene only, as the same carburetor was formerly used in connection with gasoline fuel. It appeared to THE HORSELESS AGE representative who witnessed the trial that kerosene is available in this engine because of the relatively large amount of metal that is subjected to high temperatures, rendering complete vaporization possible in the cylinder.

The Rushmore Automobile Searchlight.

The Rushmore Dynamo Works, of Plainfield, N. J., are manufacturing a powerful acetylene headlight, which they designate as a searchlight. Up to a year ago the company devoted itself to the production of marine searchlights and locomotive headlights, and built automobile lamps only to order. Arrangements for the manufacture on a large scale of their automobile searchlight were made after the first lot produced had met with favor.

The Rushmore searchlight consists of a circular drum of sheet metal, in the extreme rear end of which a powerful lens mirror is located. This mirror is made of glass, ground and polished. The back of the lens is silvered. The accompanying sectional drawing shows that the inner surface is ground to a shorter radius than

the outer surface. At the periphery the lens is three-quarters of an inch thick, while at the centre it measures but one-eighth inch in thickness. The makers claim that the gradual increase from the centre to the rim has been carefully calculated, so that scattering of the rays is avoided. To prevent wind from extinguishing the gas jet a pane of glass is placed in the forward part of the drum. Should the lamp strike some object in a collision it is not likely that the lens will suffer. We are in receipt of a photograph of a lamp in which the front glass was broken and the drum was badly twisted and bent, while the lens was uninjured.

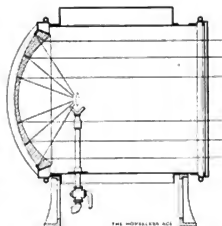
Two sizes of lens are made for automobile lamps, viz., an 8 inch and a 9 inch. When two of these lamps serve as side lights it is desirable that they show a red light to the rear. Lamps for this purpose are fitted with lenses in which a small space in the centre remains unsilvered, so that a small portion of the rays may be projected through the ruby placed in the rear cover.

The manufacturers advocate the liberal use of gas in connection with their lamps and provide the 8 inch lamp with a one-half foot burner rated at 50 candle power. Two such lights, it is claimed, will illuminate the road for 1,500 feet ahead of the vehicle and render driving at night perfectly safe.

These lamps may be equipped with a device which enables the operator to turn the lamp and light up the roadside or search for depressions or obstructions in the road before changing the course of his machine.

Mohler & De Gress Intake Valve Fastenings.

In their two cylinder vertical engine Mohler & De Gress use an improved method of fastening the intake valves and intake pipe down to the valve chamber, as shown in the illustrations. The intake seat castings are made with a radial flange on top and fit into the openings over the exhaust valves. Both engines are supplied with mixture from a single carburetor and a single intake pipe connects to the two valve chambers by means of a double intake valve cap and connection A. Flanges



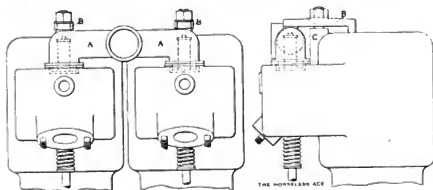
RUSHMORE SEARCHLIGHT.

on the latter fit over the flanges of the intake valve seats and the whole casting is held in place by two yokes B B resting on bosses on the casting and on the cylinder head respectively. Lugs C are cast on the side of the cylinder heads to be threaded and receive the studs for clamping the yokes B B in place. To remove the inlet valves it is only necessary to slightly unscrew the nuts on the studs, to swing the yokes through a quarter turn and to loosen the union joint with the inlet pipe. These operations can be accomplished in a moment's time.

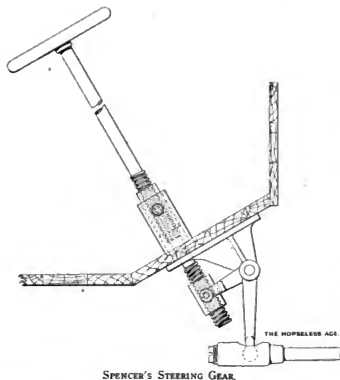
A New Steering Gear.

A steering gear of novel design has been applied to a steam tonneau built by Christopher M. Spencer, of Windsor, Conn., inventor of the Spencer repeating rifle.

As shown in the accompanying sketch, the lower end of the steering wheel shaft has a turnbuckle action through two brass sleeves, one cut with a right and the other with a left hand square machine thread to engage with corresponding threads turned on the shaft. The upper of these sleeves is mounted in trunnions in a tubular standard that rises from the footboard, and the lower is carried on one arm of a bell crank that connects with the main steering link through the usual ball and socket joint. In operation the steering wheel must of course rise and fall and tilt and from the operator, but it is said that these movements



M. & D. INTAKE VALVE FASTENINGS.



SPENCER'S STEERING GEAR.

are so slight as to be hardly noticeable. The advantages claimed are irreversibility with quick steering and slight wear of the threaded portions of the steering post and sleeves.

The New Autocar Tonneau.

In their new tonneau the Autocar Company, of Ardmore, Pt., have embodied some of the most modern features of construction, giving it the general appearance of a high powered foreign touring car. A full description of the 1903 tonneau appeared in the issue of *THE HORSELESS AGE* of December 24, 1902. No radical departures have been made in the new vehicle, a plan view of which would not differ materially from the drawing published in connection with the former description.

The flanged coil radiator has given way to a Whitlock honeycomb cooler, placed above the level of the sills, which give the bonnet the square outline and appearance which characterize this form of cooler. There are sixty-four rows of fluted tubes through which the cooling water must flow at a very low velocity, giving it ample time to cool. The water tank of the former model was secured to the front side of the dash. In the new model the tank forms part of the cooler. A fan with eight blades is placed just behind the cooler, and is provided with a belt driven pulley and means for taking up the stretch in the belt. Formerly all the tonneau motors of this make were equipped with two flywheels, which were mounted on the shaft fore and aft of the crank case. In the latest model only one wheel is employed, the rim of which is slightly heavier than the rims of the two wheels in aggregate, because of the increase in cylinder bore.

The engine is of the well known double opposed, horizontal type, and is placed under a bonnet in front. The bore is 4 inches instead of 3 3/4 inches, and the stroke 4 inches. The bells that are placed over the admission valves are now held against their seats by yokes, which can readily be removed by slightly backing off the nuts. Changes have been made in the carburetor so that it cannot be adjusted by the operator, but is set and regulated before the vehicle reaches the hands of the purchaser. The engine, transmission and circulating pump bearings can be lubricated by means of a grease cup, which is provided with six "points." One of the tubes is branched so that there are seven connectives in all. The grease is forced out by a piston screwed down into the cup.

The hinged change speed lever may be dropped down when not in use, and its quadrant has been moved up to a higher position on the control column where it is out of the operator's way. Both brakes are applied by pedals, one of which has a latch to hold it in place. The transmission brake has not been changed in design but the internal rings of the emergency brake have been replaced by external shoes, which are actuated by a double acting mechanism. Interposed between a fixed pin and the brake shoes are two coil springs to guard against dragging in the release position.

In the rear the frame rests in semi-elliptic springs (about 38 inches long), which are preferred to the former full elliptics by the builders. The tonneau has been made deeper, and now has very high backs and a high gate to protect the occupants from dust. The cushions are upholstered in tufted leather of a color harmonizing with the paint.

Fisk detachable (30x3 inch) pneumatics and ball bearings in front and rear have been adopted as standards.

According to the *Autocar*, the Daimler Company has presented four cars to M. Jenatry, winner of the Gordon Bennett Cup. This, together with the presents made to him by a tire company, makes a total of \$8,000 worth of gifts that Jenatry has received as a result of his recent success in Ireland.

COMMUNICATIONS.

The Missouri Law.

Editor HORSELESS AGE:

I have been looking in your valuable paper to see how many Missourians would "holler" at the Missouri automobile law, but there doesn't seem to be anyone kicking. What is the trouble? Is the law so absurd that automobilists take it as a joke, or have they been knocked out and not gathered their wind enough yet to protest?

I am the only automobilist in this section of the country; have run a machine 10,000 miles in this county and city, and have never had an accident with a team. Certainly, they frequently act foolishly, but I have taken so much care that everything has come out right side up, and no run-aways.

When riding in the country I always stop for teams, which is made necessary by the narrow highways, and, besides, teams will scare in the country, where there is nothing to attract their attention, more than in cities, for there traffic is generally thick and you are not noticed.

I have a license, but how many times do I violate it daily! The law says you must stop on meeting a team; "must stop," mind you. It does not say that if a horse shows fright you must stop.

There are dozens of horses in Maryville that could be driven around all the automobiles the driver wished to, and the majority of these rigs are familiar to me, so why should I stop when I see them coming? Besides, frequently a horse will begin to show signs of fright and I will pull up. The driver yells "Come on!"—he can manage him. What are you to do then? Tell him you are a criminal and dare not move until he has passed you, for fear it will cost you \$100?

Two friends of mine have the fever badly and last Sunday they went to Omaha, Neb., to look at machines. They were driven all over the city by an agency's driver, but came away without any definite opinion what they would do about purchasing.

They said this Missouri law was rather of a sticker to them. If it is enforced as it reads they would not own a machine under any circumstances, for if they should get caught up town some day at noon when there were a good many teams on the street they would have to abandon their machine and walk home or be two hours late to dinner.

I would like to hear from some of our St. Louis and Kansas City friends what they think about it. W. J. STAPLES.

[The Missouri law is certainly the most unjust automobile law on the statutes, and

we should be glad to learn of the manner of its enforcement in different parts of the State.—E. J.]

The Starting Operation.

READING, Pa., July 17.

Editor HORSELESS AGE:

Mr. Clough's article on starting, in your issue of June 17, covers the ground quite well, but in my opinion is contradictory at two points. He says, "A certain order of procedure becomes habitual and there is no likelihood of failure," but above this he says "It should not be necessary to shut the gasoline valve when making ordinary stops," and below, "It is a good idea when a machine has to be left but a short time to perform some of the starting preliminaries when it is stopped." These three statements do not agree with each other, and I am inclined to think that the certain order of procedure rigidly adhered to gives best results.

For example, on our vehicles it is necessary to open the throttle, open the needle valve which both regulates and shuts off the gasoline, and turn the starting crank. This comprises as simple a list of operations as we have yet been able to make give satisfactory results. In spite of the fact that there are but three things to do I frequently find myself attempting to start with the throttle closed or with the gasoline shut off. The reason for this is that I frequently open the throttle as I leave the vehicle so as to have it ready for next time, just as Mr. Clough advises, with the result that some other time I attempt to start without opening it and find it shut. The float in the mixer automatically prevents leakage and we frequently leave our vehicles over night without the gasoline shut off, but because of the occasional instance when this float is not absolute in its action we advise shutting off the gasoline at every stop. If one gets in the habit of shutting it off it is done unconsciously but certainly. If it is always shut off it must always be opened for starting, and one never fails to start because of a closed gasoline valve.

I therefore favor a certain order of procedure, which should be adhered to whether the stop is short or long. Of course, this order of procedure should be as simple as possible, so as to require as little time as may be to get going.

CHARLES E. DURVEA.

Unreliability of the Yellow Press in Automobile Matters.

BUNSWICK, Me., July 18.

Editor HORSELESS AGE:

Enclosed is a clipping from the New York World which is a sample of the manner in which the daily papers generally treat the subject of automobiles. About the only true statement made is that the party expects to have a good time, though that is modified by a clause which indicates doubt. I happen to have cars like two of the kind used for the trip referred

to, and would say that the steam touring car referred to as 21 horse power is a White of 10 horse power. I own one of each kind, and have run one over 3,000 miles and the other more than 2,000.

The references to half blazed trails, vague lumber trails, locking of front wheels and running engines backward are all yellow newspaper talk (and impossible feats); for while our Maine roads are rough, and will appear especially so to one who has used the smooth highway of parts of New York State, the roads over which the party will go are the best we have in our State, and there are no hills which will require such figuring as the article indicates. I have driven over the roads leading to the points mentioned in horse drawn vehicles for years—ever since I was a boy—and have made several automobile trips to most of the places referred to. Further, I am to start for a trip in the locality referred to on Monday next with a party of five all told, the average weight of the five being not less than 175 pounds per man. My steam touring car of 10 horse power would carry all of us over any hill on the route if we could seat five comfortably in it. I have no doubt the party from Orange will have a fine trip, and they will have no difficulty in reaching their destination on account of the roads. As for the eight extra sets of brake shoes, they will have no use for them.

The people of our State are civilized, and automobilists coming here will be properly treated, and they will find some of the finest scenery in the country without having to try "logging roads and half blazed trails." I might add that there will be no danger from attacks of bears or other wild animals.

B.

[The clipping referred to relates to the start of the Dill party from Orange, N. J., on an automobile tour into Maine. We agree with our correspondent that the daily press, and particularly the so called "yellow press," is not a very reliable source of automobile information. It seems to be a regular custom of the yellow journals to multiply figures in order to make the news more impressive.—Ed.]

The Boys' Automobile.

Editor HORSELESS AGE:

The automobile craze has even spread to the small boys of our neighborhood. I have a couple of urchins who have, with the assistance of a larger boy, dismantled a number of carts which they owned and built them into automobiles, on which they do a good deal of coasting and have a good deal of fun.

They have shown considerable ingenuity in construction and have arranged small vehicles with wheel steering apparatus, which works very well in coasting; also with handle lever brakes and with small horns attached with rubber tubing to small rubber bulbs, and have taken their bicycle lanterns, and with red and yellow paint and cloth up-



holstery have made quite attractive looking vehicles.

I am running a Winton 1903 car and my boys take a great deal of interest in the sport.

The photograph herewith was taken by one of my small boys.

E. T. BURROWS.

Cuba as a Winter Resort.

HAVANA, July 12.

Editor HORSELESS AGE:

Having about 160 miles of fairly good roads around Havana city, and very beautiful tropical scenery and landscapes, I think it a very good suggestion to American automobilists to spend the winter season here. The temperature is delightful and the weather is dry. The summer is the only rainy season in Cuba.

I enclose a photograph of one of our roads, a well paved highway lined with stately palm trees.

The Custom House allows a stay of three months without losing the right of re-collecting the amount of the bond on leaving.

DR. ERNESTO SARRA.



CUBAN PALM DRIVE.

New Jersey Touring Routes.

Editor HORSELESS AGE:

In your issue of July 15 C. H. Gillette, under heading "Touring in America—Southern New Jersey," on page 66, says: "Starting from Orange, the route was through Springfield, Scotch Plains, Plainfield and Metuchen to New Brunswick." This is a good route with fine roads, but a shorter way from Plainfield to New Brunswick is straight out Front street, the main street in Plainfield, to Dunnellen, where turn to left across Central Railroad of New Jersey tracks at the station, then a curving turn to right and south across Lehigh Valley tracks, a turn of a block to left and then to right again, following the turns of a fine macadam road until you strike the Metuchen-New Brunswick road, where turn to right on into New Brunswick. The road this way is shorter by fully five miles and is in excellent condition.

The route suggested by Mr. Gillette from New Brunswick through Deans, Dayton,



The Butin Rotary Pump.

A rotary pump based upon an entirely new principle has been designed by A. Butin and is being manufactured by De Dion & Bouton, of Puteaux, France. It is essentially a rotary piston pump, without valves and positive in action.

The pump comprises a casting A forming a base, a bearing for the shaft and an end plate for the pump casing; a substantially semi-spherical metal case B, which is secured to the base A by six bolts; a driving shaft journaled in the base A and a semi-circular disk C.

The shaft A is provided at its outer end with a grooved pulley D, and at its inner end with a cross piece E, which extends clear across the casing B, fitting snugly therein. This cross piece is bored out for

piece E, and disk C divide the chamber formed by the casing B into two compartments, which are constantly varying in volume as the disk rotates, one decreasing in volume while the other increases. In the position the disk occupies in the drawing the upper compartment has a minimum volume and the lower a maximum volume, and as the disk continues to rotate the compartment which is now the upper constantly increases in volume for a half a revolution of the disk. During the entire time this compartment is in communication with the suction port and water is drawn into this compartment equal to the increase in volume. When the compartment has reached its maximum volume it is closed to the suction port and opened to the discharge port by the motion of the disk. During the next half revolution of the disk the volume of the compartment considered constantly decreases, and, as the compartment is open to the discharge port during this half revolution, the water is forced out through this port.

The outer end of the driving shaft bearing is provided with a stuffing box to prevent leakage through the bearing.

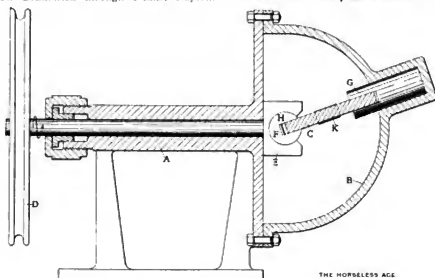
The Irish Fortnight

On July 4 a series of races were held in the Phoenix Park, Dublin, in which Baron de Forest established a new kilometre record, as already reported in these columns. The record was made with a 70 horse power Mors machine, and not a Panhard, as erroneously stated.

With these speed trials the events in the immediate neighborhood of Dublin came to a close, and on Monday, July 6, an official tour through the most interesting part of the Emerald Isle was entered upon. Newcastle (County Down) was the rendezvous for Monday night. The journey from Dublin by the most direct route is 98 miles, and while many of the motors accomplished the distance in three and a half hours, others were as long as five hours on the way. The weather, save for a high wind, which carried considerable dust, was charming, the air being clear and a bright sun shining.

The road from Dublin to Dundalk is an interesting one. The road is good outside of Drogheda. The ruins of Monasterboice are passed, but otherwise there is little to attract on the way.

After leaving Dundalk the road ascends steadily and the most charming scenery is entered upon. Passing Newry the route ran along the shore of Carlingford Lough, with the mountains towering on both sides to a sky of azure blue. After a few more miles of capital road Keshrevor was reached, charmingly situated in a sheltered bay, and wooded mountains towering behind. Cutting over a sharp promontory Kilkeel was struck, and the road thereafter was by Dundrum Bay on the right and the Mourne Mountains on the left into Newcastle. The village of Newcastle nestles at the base of



THE BUTIN ROTARY PUMP.

Cranberry and Hightstown to Philadelphia is also the best to follow on a trip from New Brunswick to Princeton. Follow the route suggested through Deans and then turn to right at road marked to Monmouth Junction. This road (good dirt) leads on to Kingston, whence there is a fine macadam road through to Princeton and thence to Trenton. In going to Philadelphia I always avoid Trenton proper entirely, keeping to the east of the city, avoiding some bad roads and having nothing but fine macadam. G. FRANKLIN BAILEY.

Wants Coil With Enclosed Buzzer.

Editor HORSELESS AGE:

Can you inform us where we can secure an induction coil with vibrator enclosed? We have seen it advertised somewhere, but are unable to find it now.

S. C. B. COMPANY.

[We shall be glad to hear from the manufacturers of this coil and forward address.—Ed.]

its entire length and the outer wall slotted, as shown. In the bore in E is fitted a metal cylinder F, which is slotted to receive the disk C. The disk is also held by means of a short shaft G, having a bearing in the casing B and being slotted at its inner end to receive the disk. The disk is pressed against the inner surface of the case B by a flat spring H, placed in the slot in the cylinder F. The short shaft G makes an angle of 20 degrees with the driving shaft.

The suction and discharge ports are formed in the casing B at opposite sides, and are closed by the disk C when the plane of the latter makes a maximum angle with the driving shaft, as in the drawing. Suppose the rotation of the driving shaft to be right handedly, when looked at from the pulley end, as indicated by the arrow, the port K is the discharge port, and the suction port is located directly opposite it in the part of the casing cut away.

The operation is as follows: The cross-

the mountain, and its large, straggling street, twining round, led up to the finishing point of the tour—the Slieve Donard Hotel.

A garage had been temporarily erected by the County Down Railway Company, but a regular gale of wind sweeping down the Castlewelan Valley and the mountain in the early morning, there arose the danger of the whole concern collapsing, and those connected with the structure anticipated events by clearing out the racing cars and letting the great marquee down. As the wind increased in the forenoon the wisdom of the action was seen, for the temporary shelter would certainly have collapsed. As the cars arrived they were allotted their respective stations and covered up with waterproofs.

A SINGLE MISHAP.

Only one accident occurred, and fortunately it was miraculously unattended with loss of life. It happened to the 24 horse power Napier of James Ochs, of London. The car with the passengers was proceeding down a slope 5 miles on the Dundalk side of Newry where a cow ran out of the field right in front. The chauffeur made a sharp swerve to the side, and in so doing did not succeed in clearing the cow, which ran over the embankment. The car fell nearly 40 feet and went crash into the bog land. In some way the occupants managed to jump clear before the bog was reached. They escaped any injury, but the cow disappeared into the bog, and the latest intelligence is that a number of men with planks had failed to get it out.

Nothing else of an untoward character occurred, and the tour was greatly enjoyed by the entire company who, after dinner, had a concert in the Slieve Donard. The arrival of the motorists naturally created very great enthusiasm among the villagers, for, as a matter of fact, they did in all the villages through which they passed. Many odd incidents occurred, donkeys and aged horses being galvanized into a display of spirit for the first time in their lives, often to the consternation of their owners. A number of owners—Irish like—improved the shining hour of the garage by bringing down their hackneys well haltered, and as the cars arrived and manoeuvred for their positions, the din was so deafening that even the shyest horse at a motor car would become as hardened to the scare as to his own maner.

On Tuesday, July 7, there were hill climbing and speed trials at Castlewelan. The course of the hill trials was 600 yards long, the first 100 yards being level and then following a 14 per cent. grade. The cars started from rest.

The first event, for the Henry Edmunds trophy, was won by E. Campbell Muir (60 horse power Mercedes) in 32.25 seconds. The motor cycle hill trial was won by A. C. Wright (Ormonde) in 41.5 seconds. Next came the speed trials, the first event being for touring cars selling at from £300

to £1,000. This was won by J. W. Cross (20 horse power Humber) in 3m. 27s. The motor cycle speed contest (cycles up to 114 pounds) was won by C. W. Hacking (Ormonde) in 2m. 50.3-ss. H. Martin (Excelsior) won in the class up to 170 pounds in 2m. 55.3-ss.

Finally came the speed trials for racing cars. A. Rowlinson (30 horse power Darraq) won in the light car class in 3m. 24.3-ss. and Louis Rigolly (100 horse power Gobron-Brillie) in the heavy car class in 2m. 52-ss. The latter won the Royal Ulster Yacht Club prize.

A Tastily Decorated Auto.

In the automobile parade at Springfield, Mass., on July 4 last some very nice decorative effects were produced. The illustration herewith shows the Winton touring car of A. A. Geisel, which participated in

for obtaining without calculation the pressure and volume during compression, the maximum explosion pressure and the theoretical indicator diagram; gasoline and air mixtures; valves and helical springs; strength and proportion of parts; a partial theory of the spark coil.

The book also contains assembly drawings of a 5 horse power single cylinder, upright, stationary engine and 5 horse power double opposed cylinder automobile engine.

Trade Literature Received.

H. W. Johns-Manville Company, 100 William street, New York.—Post card folder containing reprint from New York Herald on Barney Oldfield's record breaking race and letter from Oldfield, stating that his engine is packed with the Johns-Manville Company's "Mobile" packing. Rushmore Dynamo Works, Plainfield,



GEISEL'S DECORATED AUTOMOBILE.

the parade and was considered by many as deserving of the first prize for artistic decoration.

Book Review.

Gas Engine Design, With an Introduction on Compressed Air. By E. J. Stoddard. Published by Parker & Burton, Detroit, Mich.

Those mathematically inclined and taking an interest in explosive engines will welcome the second edition of Mr. Stoddard's book on gas engine design. The scope of the book has been greatly enlarged, the new edition containing close onto 200 pages of text. The matter is divided into an introduction and seven chapters. Following is a list of the subjects treated: Graphical construction of the $PV^m=C$ curves; graphical derivation of the principal thermodynamic equations; a new and inclusive practical table for compressed air; diagram

N. J.—List of users of Rushmore search-lights.

National Oil Heating Company, Melrose, Mass.—Pamphlet on the National Kerosene Oil Burner.

Hine-Watt Manufacturing Company, 58 Wabash avenue, Chicago, Ill.—Folder on Columbia Acetylene Gas and Oil Lamps.

John C. Karr & Co., 1020 East Ravenswood Park, Chicago, Ill.—"Karr's Portable House."

E. T. Burrowes Company, Spring and Center streets, Portland, Me.—Catalogue of Burrowes protection screens.

A correspondent writes to *The Autocar*: "When I was sitting in my car in Hereford the other day, waiting outside a shop, 'the man in the street' came along. He pointed at the oil squibs on the dashboard, and said to his mate, 'That's where they carries their beer, Bill!'"

TOURING IN

— AMERICA.

V.—Long Island.

By C. H. GILLETTE.

Long Island has always been a popular touring ground for those New Yorkers whose desire for country air and scenes leads them away from the city parks and boulevards. Its accessibility is largely responsible for this popularity, but aside from the fact that it is the most conveniently available touring territory near New York, there is much upon the island

Roslyn and Huntington into the route along the north shore.

Long Island touring routes divide themselves naturally into three sections—the south shore, the north shore and the central section. Of these the south shore is pretty well known to automobilists for nearly the entire length of the island, and the north shore is driven over extensively about as far as Oyster Bay.

The famous Merrick road is an almost straight route to the eastern end of the island, and although a dirt road from Babylon on, is in fair condition and offers but few bad grades.

In the region of the Shinnecock Hills it requires a good climbing automobile to make the run without accidents. There is a rolling stretch of country through

At Montauk Point there are hills of considerable magnitude. From the top of these New London can be seen on a clear day, and the declivities are so steep that walking is by no means a comfortable pastime.

One of the prevailing fallacies with regard to Long Island is that it is a flat country from end to end. This is not true, but it obtains as a belief because of the fact that the entire western half of Long Island and more is relatively flat. East of a line drawn from Port Jefferson to Patchogue and along much of the south shore—the entire length of the island, in fact—there are hills which are sometimes rather stiff for negotiation by machines, except the most powerful kind. Throughout the rolling portions of the



SHINNECOCK HILLS AND BAY FROM OLD REVOLUTIONARY FORT AT CANE PLACE.

in the way of scenic beauty and points of interest to tempt the lover of nature and history.

The western end of the island, from the Suffolk County line, is a network of splendid macadam roads, for the most part nearly level. It is, of course, this section of the island that is most familiar to automobilists. There are so many attractive places there, and they are so easily reached, that almost everyone has at some time or another visited them. From Seagate to Babylon is a succession of watering places, including Coney Island, Manhattan Beach, Far Rockaway, Arverne, etc.

The entrance from New York is by way of the East Thirty-fourth street ferry to Long Island City. Two blocks from the ferry an oblique turn to the left into Jackson avenue starts you on the road either to Jamaica or Flushing. A turn to the right at the Court House takes you to Jamaica on the road to the south shore, while straight ahead on Jackson avenue brings you to Flushing and on through

Southampton continuing to Easthampton, and just beyond, at Amagansett, the touring possibilities come to an abrupt end. It is not advisable to go beyond Amagansett, and though it is possible that under certain conditions tourists might go through to Montauk without delay and discouragement, it is not probable in any but the fairest weather and under the best auspices.

If, however, a tourist's persistency dictates a trip to Montauk Point, it is best to take the beach road; but this road is an exceedingly difficult one to run over except in fair summer weather, at low tide. Although the sand appears firm and the road is at places apparently considerably above the water level, it will be found that the water will seep up through the roadway as the wheels pass over it. The ocean is held back by the sand dunes which form on the south shore, but this does not prevent the presence of moisture under the road and in the ground for a considerable distance from the shore.

island there are long stretches of flat country. The hills, while low, are clustered.

The north shore is not so familiar to tourists as is the south shore, but it offers just as many attractions and facilities and is perfectly practical for the automobile. The road is excellent as far as Smithtown and from there on to the terminal at Greenport is fair, with some grades—but none that are impossible.

Around Oyster Bay the roads are generally good, and east of that point there is macadam the entire way. It is said that in the western end of the island, up as far as the Suffolk County line, there are 600 miles of macadam roads. It should not be assumed from this statement that there are not macadam roads beyond, for in many parts of Suffolk County are found considerable stretches of macadam; but to reach these one is compelled to run over dirt roads. Generally speaking, the dirt roads are much above the average of their kind. Where the danger lies is in the gravel beds,

which, in certain points along the north shore in Suffolk County, are almost prohibitive of successful automobiling and in one or two places are an absolute menace to personal safety.

The hills in the neighborhood of Oyster Bay, Glen Cove and Huntington afford superb views of the Sound and the Connecticut Shore, with all the changing scenery of a well dotted body of water.

Tourists will undoubtedly make a Mecca this year of President Roosevelt's home, Sagamore Lodge. To reach it one must climb the north shore road at Oyster Bay Cove and take what is known as the "Cove road." It is a pleasant, short run.

Huntington, an important point on the north shore road, 35 miles from New York, has just celebrated the 250th anniversary of its foundation. It is rich in historic lore and is chiefly celebrated because of its being the spot where Nathan Hale was captured by the British. Another claim to world wide fame lies in the fact that Walt Whitman, the poet, was born there. The house in which he first saw the light is still standing. Huntington's oldest church was erected in 1784, and this took the place of a much older structure demolished by the British.

The Lee house, erected in 1703, and now 200 years old, is still a neat and habitable dwelling in Huntington. Rear Admiral Hiram Paulding, who rendered distinguished services to his country, was a resident of Huntington, in the closing years of his life, dying there in 1878. His substantial mansion is one of the best known objects of interest in the town. Spots dignified by the visit of General Washington at the close of the Revolutionary War are also called to the stranger's notice. Taken all in all, the town has within its borders enough to hold the tourist's attention for several hours.

There are hills through the eastern end of Long Island as far as Wading River, from which point the north shore divides, giving two routes to Greenport. There is no possible question that the best route from Wading River to Greenport is by way of Riverhead and Mattituck. The other route, by way of Baiting Hollow, contains a bad stretch of gravel road, formerly a feeding ground for cattle, and is so situated that any possibility of its ever being improved, with any reasonable expenditure of money by the authorities, is past all hope.

A second reason why the Riverhead-Mattituck route is preferable is that there are two good hotels at Riverhead. Good hotels are rather rare on Long Island, the main reason being that as so many of the hostleries have different proprietors from year to year any continued excellence is not possible. At Jamesport on this route there is also a good hotel and many delightful country places, the point being a nucleus around which are clustered the summer villas of Brooklyn politicians.



THE OLD TOWNSEND MANSION AT OYSTER BAY.

Beyond Greenport it is possible to push on to the extreme end of the "north fluke" at Orient Point. This is considerably east of Shelter Island, which lies south at the neck of the great Peconic Bay, and from Orient Point can be seen Saybrook and New London, with Plum Island just ahead, where Long Island Sound opens into the great Atlantic. Beyond is Block Island.

(To be continued.)

Putting in Gaskets.

When putting in a gasket (on a gasoline engine) composed in part of rubber, screw

up as tightly as possible with a 6 inch wrench all around, and start the engine with the relief cock and the usual compression relief open. Do not close either one at first, as too great compression would blow out the gasket when the engine becomes warm and the gasket softens. Stop the engine, and tighten each bolt and nut equally as far as possible. Do this at least four times before taking the car out on the road. Then go over the nuts again in five miles, and again when you "roll in." A gasket can't be too tight, and the time to tighten it is when it is hot. It is really surprising how many quarter turns you can give after you think it's tight.



THE SOUTH SHORE ROAD AT BABYLON.



The 1904 Rambler will be a detachable tonneau.

Newton, Ia., is said to have about one automobile to every two people.

The Toledo Automobile Manufacturing Company, of Toledo, Ohio, has filed papers of dissolution.

The news is received from abroad that the White steam cars are shortly to be manufactured at St. Denis, France.

The Leroy Automobile Company, of Berlin, Ontario, is trying to organize a \$100,000 stock company to extend its business.

The Chillicothe Motor Storage and Manufacturing Company, of Chillicothe, Ohio, are planning to build two automobiles a week.

James B. Dill and party, of East Orange, N. J., left there July 15 in a number of cars for a trip to Rangeley Lake, Me. The distance is 500 miles.

At Jackson, Mich., July 16, Barney Oldfield is reported to have lowered the world's automobile record for a mile on a half mile track. Time, 1m. 16s.

The Standard Wheel Company, of Terre Haute, Ind., makers of the Overland runabout, are preparing to add a parcels delivery wagon to their line.

George A. Miller, of Kenton, Ohio, is seeking to form a \$250,000 stock company in Toledo, Ohio, for the exploitation of a storage battery he has invented.

The public automobile service of the Chicago Motor Vehicle Company, in Rush street, Chicago, has been discontinued. Poor street surface is given as the reason.

An automobile has just been tried in Boston for patrolling an outlying police district. The police board reports that it successfully took the place of four mounted officers.

Banker Brothers, of Philadelphia, report the following sales for the week ending July 18: John S. Whilldin, Philadelphia; Alexander Allen, Chestnut Hill, Pa.; Dr. J. M. Dotterer, Wayne, Pa.

In Philadelphia, July 15, John Godfrey stole an automobile from the barn of George D. Widener, but collided with a hay wagon while attempting to escape. He then returned for another machine and was captured.

The stockholders of the Olds Motor Works have voted to increase the capital stock of the company from \$500,000 to \$2,000,000, and to increase the capacity of their Detroit and Lansing factories to fifty machines a day.

Arthur L. and George A. Banker tendered a banquet to the Pittsburg employees of the Banker Brothers Company at the Dorset Hotel, July 11, in recognition of their suc-

cesses in the Pittsburg races on that day. After the entertainment was over an automobile trip was made through the parks and over the boulevards of the city.

Action to have the Rumson road, in New Jersey, rebuilt with stone is under way.

The Hoeftler-Berg Automobile and Arms Construction Company, of Dayton, Ohio, will soon remove to South Jamaica, N. Y., where it will erect a plant that will give employment to 500 men.

Horace E. Swift, of Hyde Park, Mass., has been appointed receiver for the Motor Cycle Manufacturing Company, of Brockton, Mass., makers of the Marsh motor cycle. The liabilities are \$60,553; assets, \$48,599.

The trustees in dissolution of the New England Electric Vehicle Company, of Boston, Mass., have declared a third and final dividend of 20 cents a share, payable July 15. This makes the total dividend in liquidation \$3.76 a share.

The T. L. Widmayer Company, Atchison, Kan., inform us that they have evolved a very successful carburetor consisting of a tank 18 inches long and 6 inches in diameter, with layers of burlap one-half inch apart and held by a flat spring.

It is rumored that the price of the Oldsmobile runabout next year will be reduced to \$500 and that the company will also manufacture a double cylinder (4x4 1/4 inch) detachable tonneau car to sell at \$750 and \$650 with and without tonneau respectively.

W. N. Murray, of Pittsburg, Pa., has bought the interest of his partner, D. N. Seely, in the Seely Manufacturing Company. The transaction is said to have involved \$100,000—the capitalization of the concern. One hundred automobiles were turned over.

A meeting of automobile owners and club members was held in Kansas City, Mo., July 16, at which plans for the coming interstate automobile meeting in that city were informally discussed. Hill climbing and speed tests will probably be features of the meet.

H. B. Shattuck & Son have just opened an establishment in Newport, R. I., to be known as the Searchmont Automobile Livery. Only new 1903 Searchmonts will be rented, and the chauffeurs will be experienced men from the Searchmont factory. A garage and repair shop will be located near by.

An automobile is now in use for carrying the mails over a rural free delivery route near Shelbyville, Ind. The distance of 28 1/2 miles can be covered by an automobile in 3 hours and 15 minutes, while with a horse 8 hours are required. A daily average of 305 pieces of mail has to be handled.

In a recent consular report it is said that a hitherto unknown plant, which produces rubber, has been discovered in Africa. The rubber is found in the roots, which are said to contain over 6 per cent. of excellent gum when one month old. If this report

proves correct, rubber cultivation would seem commercially practical in a degree hardly to be expected of the slow growing *Ficus elastica* and *Hevea guianensis* which at present are the chief sources of rubber.

Harry Unwin, secretary of the National Association of Automobile Manufacturers, is well on his way toward Cleveland. It is not yet decided whether the reliability run will be to Cleveland or to Pittsburg, although the former is most likely to be settled upon. The question of securing a suitable track for the race meet that is to be held in connection with the run will influence the choice of route.

At Toledo, Ohio, July 14, Adelbert H. Krueger, a well known post office employee of that city, was run over by a Toledo gasoline touring car, suffering injuries from which he died the next day. The automobile was operated by a youth in the employ of the Kirk-Hall Company, and the accident occurred just after Mr. Krueger had alighted from a street car, which kept him from seeing the machine until it was almost upon him. The result of the inquest is not yet known.

The Cragg Manufacturing Company, 713 Nineteenth street, Washington, D. C., has brought out an electric lock switch, called the "Ko-ne," for locking a gasoline car against meddling by unauthorized persons when standing in the street, as is required by the regulations in some localities. The lock is placed in the primary circuit of the ignition wiring. The driver, by means of this lock, opens the circuit and then withdraws the key, and the engine cannot be started until the key is replaced and turned to close the circuit.

Following upon the bankruptcy proceedings that have been instituted against the Foster Automobile Company, of Rochester, N. Y., Paul Densmore, secretary of the company, has been charged with forgery and grand larceny. It is said that promissory notes to a total of \$30,000, in many cases made out in fictitious names, have been cashed at different Rochester banks by Densmore. A warrant for his arrest has been sent to Brooklyn, N. Y., where he was last heard from. There are ugly rumors afoot to the effect that Densmore is not the only culprit.

A dispatch from Omaha, Neb., dated July 12, states that Dr. H. Nelson Jackson, of Burlington, Vt., accompanied by Sewall K. Jackson, a professional chauffeur, of Tacoma, Wash., arrived in Omaha that afternoon, having made 3,800 miles in an automobile from San Francisco. He started May 23 and lost eighteen days on account of the weather and stops for repairs. He will continue his trip eastward to Chicago and Cleveland, thence to New York and to his home in Vermont. Dr. Jackson is making the trip purely for pleasure. He expects to reach Burlington August 1. His experience has been exciting, and at one time the two men went thirty-six hours without food.

LEGISLATIVE AND LEGAL.

In Nashville, Tenn., the question of an automobile ordinance is receiving attention.

As finally passed, the automobile ordinance of Madison, Wis., provides a speed limit of 12 miles an hour.

R. Drisco, of Boston, Mass., was fined \$10 July 15 for permitting steam to escape from his automobile, thus frightening horses.

Detroit has passed an ordinance regulating the use of freight automobiles, as distinguished from those used for pleasure or light delivery only.

The automobile ordinance of Grand Rapids, Mich., is likely to be revised by the insertion of a clause providing for the display of numbers or initials.

The State Highway Commission of Massachusetts has commenced the work of registering automobiles and licensing operators, as provided for by the new State law.

Irving N. Atwood, of New York city, has been fined \$25 and sentenced to refrain from operating an automobile for two weeks. Mr. Atwood pleaded guilty to running his machine at 18 miles an hour.

Charles A. Duerr, a New York city automobile dealer, is made defendant in a suit brought by Harry Yates, of Buffalo, for \$1,000 damages. Yates asserts that Duerr defrauded him by selling as new a worn out runabout.

Two automobilists have recently been arrested in North Beverly, Mass., two in Worcester, and one each in Lynn and Haverhill for violating the speed provisions of the new Massachusetts law. Fines were imposed in each case.

Dr. H. H. Muggley, of Oshkosh, Wis., has now been arrested on a charge of having exceeded the local speed limit for automobiles—this action being an outcome of the recent accident in which a man was killed by Muggley's machine.

The Chicago Automobile Club has asked for an injunction restraining the board of South Park commissioners from enforcing the ordinance requiring numbers on automobiles. The ordinance is claimed to be unconstitutional, and test cases are likely.

Owners of driving horses at Wisconsin summer resorts are attempting to have the traction engine law of the State applied to automobiles. Under this law two men must precede and two follow every mechanically propelled vehicle to warn horsemen.

The board of park commissioners of the city of Boston has decided to cease issuing numbers to motor vehicles, and to accept the State register numbers. Special permits are still required, however, and vehicles are not permitted to run between the hours of 11:30 a. m. and 8 p. m., except in

certain places. Also, when stopped, an automobile is required to have its machinery at rest.

The courts are to rule upon the justice of a \$150 charge recently assessed against Buckingham Chandler, of Chicago, by Hagman, Hammerly & Griffen, for "a new pump, new burner, new cones, new piping, new varnish, and new back covering" on a steam machine.

Club Notes.

TOLEDO A. C.

The Toledo Automobile Club, of Toledo, Ohio, at a meeting held July 14 amended its constitution and arranged for a run to Point Place, July 18, to which representatives of the local press were invited. Thirty-one new members were added at the meeting.

A. C. A.

The Automobile Club of America has just distributed to its members a neat 100 page booklet containing the text and digests of the State automobile laws of New York, New Jersey, Pennsylvania, Connecticut, Massachusetts, Rhode Island, Vermont, Maine and Delaware.

HAVANA A. C.

The Havana Automobile Club, of Havana, Cuba, was organized July 5, with Minister Squiers as president; Enrique Conill, vice president; René Berndes, secretary, and Honore Laine, treasurer. The organization was celebrated by an automobile race from Marianao to Guanajay. Honore Laine, in a 16 horse power Darracq, won. Time, 37 minutes.

LOS ANGELES A. C.

The Los Angeles (Cal.) Automobile Club was organized July 8, with eighteen members. The officers are: Edward R. Feuerborn, president; A. R. Mains, vice president; Charles Fuller Gates, secretary; H. A. Bingham, treasurer; Ralph C. Hamlin, captain; William K. Cowan and Reuben Shettler, directors. A membership of 200 is expected within sixty days.

New Incorporations.

The "Broadway Garage," of New York city, has been incorporated with \$3,000 capital. C. T. Osborne, F. W. Haense and R. F. Graecen are the incorporators.

The Huber Automobile Company, of Detroit, Mich., was incorporated July 14, with a capital of \$100,000. Emil Huber, Edmund Sprung and Alvin Theener are Detroit stockholders.

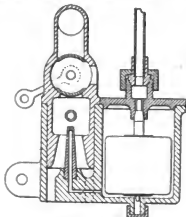
The Stamford Motor Company, of Stamford, Conn., has filed a certificate of organization. Theodore Hoyt is president; D. F. Wardwell, vice president; F. A. S. Snedeker, secretary, and C. H. Lounsbury, treasurer.

MOTOR VEHICLE PATENTS..

United States Patents.

733,625. Carburetor for Motor Bicycles.—A. Clément, of Levallois-Perret, France. July 14, 1903. Filed June 4, 1902.

The carburetor consists of a float feed chamber, a spraying chamber and a special



No. 733,625.

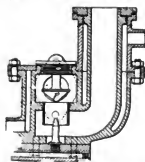
cock. The latter permits the quantity of gasoline and air sucked in and also the quality of this mixture to be regulated. A portion of the exhaust gases pass through the tube which is located just above the spraying nozzle. Additional air is drawn into the cylinder when the air cock is set, so as to effect communication between the atmosphere and the cylinder.

732,944. Transmission Device for Motor Vehicles.—C. Jenatzy, Fils, of Brussels, Belgium. July 7, 1903. Filed March 17, 1903.

The object of the invention is to permit of dispensing with a change speed gear. The device is characterized by magnetic driving gear arranged between the crank shaft and the driving shaft of the car by means of a field magnetic crown, mounted on the crank shaft and acting upon an armature mounted on the driving shaft. A dynamo supplies current to the field magnetic crown.

733,695. Pulverizing Carburetor for Petroleum Motors.—F. Charron and L. Girardot, of Paris, France. July 14, 1903. Filed March 22, 1902.

The object of the invention is to provide



No. 733,695.

means for preventing the expansion and cooling of the mixture, and to render the infiltration of water in the jacket of the carburetor impossible. The inventors make a special claim for the flange that surrounds the air inlet pipe and closes the water chamber surrounding said pipe.

732,943. Clutch Mechanism.—C. Jenatzy, Fils, of Brussels, Belgium. July 7, 1903. Filed December 16, 1902.

The invention relates to magnetic clutches and has for its object the production of variable magnetic energies at will, to effect positive action of the clutch.

733,354. Draft Device for Automobile Furnaces.—F. C. Chesebrough, of Denver, Col. July 7, 1903. Filed December 31, 1902.

The invention relates to automatic means for regulating and controlling the draft of automobile boilers. The object is to prevent back draft, to increase the air supply as the velocity of the vehicle increases and to dispense with a fan.

733,076. Power Transmission Gearing.—C. G. Nye and F. E. Jenkins, of Columbus, Ohio. July 7, 1903. Filed January 10, 1903.

The invention relates to planetary gears. 733,103. Variable Speed and Reversing Mechanism.—R. B. Hain, of Los Angeles, Cal. July 7, 1903. Filed February 4, 1903.

732,870. Self Propelled Vehicle.—H. Lemp, of Lynn, Mass. July 7, 1903. Filed March 27, 1900.

733,440. Pneumatic Tire.—Aaron Vre-

land, Singac, N. J. July 14, 1903. Filed July 30, 1902.

733,444. Carburetor.—Lester F. Washburne, San Francisco, Cal. July 14, 1903. Filed June 30, 1902.

733,477. Rotary Cylinder Engine.—James G. Gracey, St. Louis, Mo. July 14, 1903. Filed November 13, 1902.

The Meet at the Empire City Track.

The races to be held at the Empire City track, at Yonkers, N. Y., July 25, promise to be hotly contested, and it is not unlikely that several new records will be made. Besides the Oldfield-La Roche match, in which the 56.2-5 seconds Ford racer will be pitted against a Paris-Madrid Darracq, there will be five other races, as follows:

First Race.—Fifteen miles. Machines of any weight and motive power, the Oldfield and La Roche machines being barred. First prize, \$100 silver trophy; second prize, \$50 silver trophy. Osborne W. Bright's 60 horse power Mercedes, the only one of its kind in the country and a duplicate of the machine that won the Gordon Bennett race, has been entered for this event, and will be driven by Laurent Grosso, who won the Nice races last year. The 80 horse power Peerless racer that ran in the Gordon Bennett race has also been entered in this race, and will be piloted by Clas. G. Wridgway. A third entry

is a 40 horse power Decauville, just imported by J. E. Chisholm, and to be run by E. H. Fredericks.

Second Race.—Ten miles. Machines of any kind under 1,800 pounds. First prize, \$100 silver trophy; second prize, \$50 silver trophy. A Northern car and at least two others are entered for this race.

Third Race.—Five miles. Machines of any kind under 1,200 pounds. First prize, \$100 silver trophy; second prize, \$50 silver trophy.

Fourth Race.—Mile record trials. Open to all machines. Silver trophy for fastest mile and a medal in each class to any contestant who may lower the track record for the class in which his machine is eligible.

Fifth Race.—Three miles, for amateur motor bicycle championship of America. Open only to regularly catalogued motor bicycles, equipped for pedal propulsion. Contestants must be registered N. C. A. amateurs. Gold, silver and bronze medals.

A. R. Pardington, chairman of the racing board of the A. A. A., will referee the Oldfield-La Roche match. S. M. Butler, Frank G. Webb, M. J. Budlong and Roland Douglas will serve as timers; while A. J. Picard will be starter. Frank Evland is to act as umpire.

Although all the entries for the different events are not yet known, manufacturers and automobilists generally are showing great interest in the meet, and there promises to be many speedy cars entered.

SPECIAL TOURING NUMBER

ISSUE OF SEPTEMBER 2.

Midway between the summer and the fall touring seasons.

1. Interesting and instructive experiences of automobile tourists at home and abroad.
2. Novelties and utilities for the tourist.
3. Critical comments on leading touring machines, foreign and domestic.
4. Customs and speed regulations.
5. Other features of equal interest. Our Specials are always novel and thorough.

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Reach the consumer through our Touring Special of September 2. Advertising in a journal of standing and paid circulation pays. A trial is no experiment.

THE HORSELESS AGE.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to
Motor
Interests

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SPECIAL TOURING NUMBER.

For the issue of September 2, midway be-
tween the summer and the fall touring sea-
sons, we announce a special Touring Number,
confined strictly to this popular and most
enjoyable pastime. The recent growth of
automobile touring in the United States
warrants us in promising a treat for all who
are interested in the subject or who are sus-
ceptible to its charms and desirous of joining
the increasing body of American auto tour-
ists. One of the most interesting features of
this number, naturally, will be the depart-
ment set aside for the experiences of tourists
on the road in all parts of the United States
and its foreign countries. In order to make
this department as novel and helpful as pos-
sible the editor invites correspondence from
any of his readers who can contribute suit-
able touring experiences within the specified
time. Instructive data or any amusing inci-
dents relating to touring are also desired.
It is our intention in our Touring Number to
provide solid information as well as enter-
tainment, and to stimulate among the Ameri-
can public the love of nature and the con-
venient and modern mode of enjoying it—
automobile touring.

Non-Penalized Stops.

Last fall, in the discussions following the
Endurance Contest to Boston, a number of
manufacturers declared in favor of penaliz-
ing all stops, for any reason whatever, in
future endurance contests. It was claimed
that in case some part on the machine
heated, for instance, and a non-penalized
stop was made, it might avoid trouble
which might otherwise have led to penal-
ized stops, and that unfair advantages could
be gained in several ways by unscrupulous
competitors.

We have already declared against penal-
ization of all stops, and the notes on the
proposed route which have been sent to us
further confirm our conviction that it would
be exceedingly ill advised to adopt this rule.
The first reason against penalizing all stops
is that it makes the chances of success of a
car dependent upon other factors than
merely the car and the driver, and would,
therefore, reduce the value of the contest
as a reliability test. Secondly—and this is
really the most important reason—it would
encourage disregard of the law and the
dictates of prudence in meeting shying

horses. In the Catskill Mountain region,
for instance, the roads are exceptionally
narrow, and the horses unaccustomed to
automobiles, and to penalize stops made to
let shying horses pass, and thus comply
with the law, would be a direct invitation
of disaster.

Hence penalizing all stops would be a
foolish and dangerous proceeding, and
should not be thought of.

Where the American Industry Stands.

The defeat of the American team in the
Gordon Bennett Cup race has again created
the impression abroad that America is sev-
eral years behind in the construction of
automobiles. This impression may be cor-
rect when cars for road racing are consid-
ered, but unfortunately the public too often
confound racing and service cars. That
America is behind in service cars is an en-
tirely mistaken notion.

Quantitatively, there is absolutely no
doubt that America now leads the world
in automobile construction. This fact was
impressed upon us very forcibly when read-
ing in a German contemporary, a few days
ago, that the estimated output of the entire
automobile industry of that country this
year will not exceed 3,000. In this coun-
try the largest manufacturer is now turning
out machines at the rate of over 100 a
week, we are informed, which corresponds
to a yearly production of nearly twice that
of the entire German industry; two manu-
facturers turn out about fifty per week
each, one thirty a week, and so on. The
total production of all kinds and sizes of
cars will hardly fall short of 30,000 this
year, which is far greater than the pro-
duction of any other country, France not ex-
cepted. The above quoted German au-
thority estimates that the output of the
French industry is about five times that of
the German industry, or 15,000 cars per
year.

Another indication of the extensive use

of automobiles in this country is furnished by the registration lists in several States and cities. In New York State alone over 7,000 machines have been registered since the Bailey law went into effect; in New Jersey about half that number have been registered; in Connecticut about 1,000, etc. As the population of New York State is about one-twelfth that of the whole country, if automobiles were used in the same proportion to population all over the country, there would be some 60,000 machines in operation now, as undoubtedly 5,000 of the 7,000 registered at Albany are owned by residents of the State. Autos are relatively more common, however, in the Eastern States, and the total number in use therefore falls somewhat below this figure.

Looking at the subject from the standpoint of quality, there are a number of machines manufactured in this country which leave nothing to be desired either as to material or workmanship, and compare favorably with anything produced abroad. These machines, of course, are expensive. That the low priced machines do not embody the very highest grade of workmanship and material is natural, as high grade workmanship and materials fetch high prices, and only a philanthropist could embody them in a cheap machine. This condition holds good everywhere.

Standardization of Crank Shafts.

In another part of this issue will be found an article on crank shafts for single cylinder gasoline engines. The article contains a considerable amount of data on crank shafts of this kind found on actual machines, and some suggestions regarding standardization of such shafts.

Before it is attempted to standardize crank shafts it seems really necessary to standardize cylinder dimensions. At present there is absolutely no uniformity in cylinder dimensions. A few dimensions, $4\frac{1}{2} \times 6$ and 5×6 for instance, are used by a number of manufacturers, but otherwise practically every manufacturer has his own dimensions, which in some instances run in sixteenths of an inch. It seems unnecessary to employ any other dimensions for bore and stroke than full inches and halves, as the difference in power between engines, say, of 4 and $4\frac{1}{2}$ inches bore respectively is only about 1 horse power, so that by employing a scale of sizes in cylinder bores running in half inches almost any integral number of horse power

could be obtained. Satisfactory gradations in rotative speed could also be secured by varying the stroke by half inches. Uniformity in stroke is really more essential than exact uniformity in bore, as the same crank forging might do for cylinders differing by one-quarter inch in bore, but would not answer for engines of different strokes.

Gasoline engine design has now advanced sufficiently to warrant standardization of crank shafts and other parts. Standardization will result in avoiding much unnecessary expense for dies and extra machine work. In a drop forged shaft there is absolutely no machine work on the crank arms, and only the pin and the journals need to be turned up—that is to say, if no balance weights are to be fixed to the crank. If balance weights are to be used the sides and end of the crank arm must, of course, be planed up to receive these balance weights.

The designs shown in the article are put forward merely as suggestions, and we invite criticism of same from any interested source.

Co-operative Garages.

A plan is under consideration in this city for establishing a system of garages or storage stations on a co-operative basis. The scheme is backed by prominent members of the A. C. A. and is reported to have considerable chance of success, unless the Association of Automobile Dealers succeeds in preventing it. The garage men of the city, of which the Association of Automobile Dealers is largely composed, are, of course, strenuously opposed to such an idea, particularly as the plan provides not only for the caring for members' machines (for which only the actual costs are to be charged), but contemplates also a bid for outside business. The objection of the storage station men is therefore readily understood, and is not without reason, as they have in many cases invested extensively in buildings and equipment, and have legitimate trade interests which are threatened if the co-operative garages should be established and enter into competition with them.

We believe, however, that the proposal of co-operation is rather the result of unsatisfactory treatment at the garages than a desire on the part of the promoters to make money or to have their machines kept free of charge. A number of corrupt practices have grown up in connection with

garages which have been most annoying to owners. The question, of course, is whether such practices could be prevented in the co-operative garages, and in this respect the question of these co-operative garages bears much resemblance to the much discussed theme of public versus private ownership of public transportation, intelligence and supply corporations. There is little doubt that the objectionable features at present connected with the garage business will be removed by stronger competition and by the weeding out of incompetent and disreputable concerns in the future. The proposal of co-operative garages has at least the one good point that it will forcibly call to the attention of all garage men that the automobile public is fully alive to the present weaknesses of the garage business.

Fatal Accidents—Warning.

During the past fortnight fatal automobile accidents have occurred in the vicinity of Brooklyn, N. Y.; Schenectady, N. Y., and in Providence, R. I., and, as in at least two of these cases recklessness on the part of the driver was the cause of the gravity of the disaster, *THE HORSELESS AGE* takes occasion again to sound a warning note to automobile drivers. We are well aware that accidents must occur in the operation of automobiles, some of them fatal, as is true of horse traffic, street car and railroad transportation. But in connection with the older forms of traffic much has been done in the long years of their development to minimize the danger of accident, but in the case of automobile accidents one cannot fail to be impressed with the fact that the newness of this form of locomotion has an important bearing. If the inexperienced driver were eliminated and the speed craze ceased to exist, automobile accidents would be much less numerous than they are.

The speed craze, fostered by automobile racing, particularly road racing, is responsible for most of the serious accidents. It is only necessary to make a comparison of the relative number of serious accidents with high powered touring cars and with runabouts to gain an idea of the relation between speed and danger. Within a year about a dozen persons have been killed by a certain type of foreign touring-racing car of which only a few hundred were manufactured in that period, while we cannot at the moment recall a single fatal accident with either of two well known types of

runabout manufactured in this country. of which together over 10,000 have been put out. It is true that the greater weight of the touring car is a factor tending to aggravate an accident, but it will be found upon investigation that in most cases excessive speed was the principal cause of the fatalities.

It is needless to say that a fatal accident makes a profound impression upon the community and is bound to do a great deal of harm to the automobile business, unless it can be conclusively proven that the driver was solely to blame or the accident was brought about by conditions which do not obtain in ordinary running. However, an ounce of prevention is always worth a pound of cure, and the most effective manner of avoiding harm to the industry from this cause is by concerted action of the clubs and the trade associations to suppress scorching. A number of clubs have recently passed resolutions to expel scorers, but these resolutions seem never to be carried into effect. All the clubs should place the habitual scorcher under the ban, and energetic measures should also be taken to punish professional chauffeurs for reckless speeding.

Single Cylinder Gasoline Engine Crank Shafts.

We have recently gathered considerable data on crank shafts of single cylinder gasoline automobile engines manufactured in this country, with a view of gaining an idea of average present day practice in this line, and to encourage the standardization of such shafts. With a few exceptions the manufacturers obligingly furnished us with the dimensions of their shafts, which leads us to believe that there is a very general desire for the standardization of this particular part.

The data obtained show considerable variation in practice, which may in part be accounted for by variations in compression and in rotative speed. Such differences must of course be neglected when attempts are made to standardize shafts. As a matter of fact, most designers are approaching toward a moderate compression of about 75 pounds gauge and medium piston speed of from 600 to 800 feet per minute. Hence the variations in these two factors are really no obstacle to successful standardization. Of course, some designers may adhere to extreme speed and extreme compression, and for engines of such design crank shafts of standard dimensions would not be suitable.

At present crank shafts are made either from solid billets or from drop forgings. The former is a very expensive method and is only employed in the manufacture on a small scale. It gives, however, a crank shaft of very high quality, as a high carbon steel may be employed and absolutely no internal strains are set up in the shaft in the process of manufacture. With the drop forging process a softer steel must be used, as the high carbon steel will not flow well in the die. This calls for slightly more liberal dimensions in a drop forged shaft. Yet the drop forging process is the only real manufacturing process for crank shafts, and nearly all the shafts for which dimensions are given here are of the drop forged variety.

Dimensions were obtained of crank shafts

used on the following makes of cars (all single cylinder): Packard, Northern, Winton, Knox, Rambler, United States Long Distance, Pierce, Howard, Auto Supply, Orient, St. Louis, Mohler & De Gress. These, it will be seen, cover fairly well the field of single cylinder cars. From the data thus obtained formulae have been deduced representing average practice, and a number of cranks designed for the most common engine dimensions. These formulae and designs are presented not for adoption as standards, but as a basis for discussion preceding the adoption of standards, and we shall appreciate any criticism of the designs and any comment on the subject from interested parties.

Before proceeding with this subject it is well to draw attention to one difference in stationary and automobile engine practice which does not seem to have received the attention it merits from automobile engine designers. The greatest stress on the crank arms and on the crank journals occurs during the explosion stroke, the result of two opposing forces, viz., the pressure of the burning gases on the piston on the one hand, and the inertia of the flywheel and the resistance of the load on the other. In stationary practice it is customary to employ two equal flywheels, one on each side of the crank, and, as during the period of greatest stress in the crank arms the inertia of the flywheel is the chief resisting force, the stress in the two crank arms is substantially equal. In an automobile engine, on the other hand, it is practically universal custom to employ only a single flywheel, and that is placed on the side of the crank from which the power is taken. Hence one of the crank arms takes practically all of the strain due to the reaction of the "power" and "load," and the other one only serves to steady the crank pin. Similarly, one of the crank journals transmits practically all of the power and the other one practically none—only that required to drive such accessories as inter-rupers, pumps or fans. Consequently one crank arm and one crank journal should logically be made considerably smaller

Calendar of Automobile Dates and Events.

August 10-22—Tourist Motor Bicycle Reliability Trials.

August 14-15—Meeting of the Association of Licensed Automobile Manufacturers at Niagara Falls.

August 30—International Races of the Frankfurt Automobile Club, Frankfurt-on-the-Main, Germany.

September 6-13—Vienna Automobile Week.

September 18-24—English Reliability Trials.

October 5.—Paris Camp and Delivery Wagon Trials.

	Bore of Cylinder, inches.		Stroke, inches.		Crank Pin Bearing.		Crank Arm.		Diam of Crank Shaft, Bearing, inches.		Length of Crank Bearing.		Specific Crank Pin Pressure.								
	b	s	d	l	w	t	d	e	f	r	p	i	m	f	d	e	d	e	d	e	
A	5	8	32	3	3	1	8	1	5	5	5.33	1.2	2.4	0.30	5	1	1.13	1.4			
B	5	6	12	2	2	1	12	1	12	12	9.41	1.7	2.33	0.33	4	1.29	1	1.17			
C	6	6	2	2	2	1	12	1	12	12	6.50	1.37	3.8	0.28	3.66	1.45	1.14	0.86			
D	2 1/2	4 1/2	1 1/2	2 1/2	Crankpin is screwed into flywheel.			1 1/2	2 1/2	2 1/2	4.3	2	....	0.33	4.5	1.29	1	....			
E	3 1/2	4 1/2	1 1/2	1 1/2	1 1/2	1 1/2	12	1 1/2	12	12	12.31	1.09	12.31	0.25	4.58	1.91	0.79	....			
F	5 1/2	6	12	2	2	1	12	1	12	12	4	7.30	1.66	0.28	6.39	1.5	0.96	1			
G	4 1/2	6	12	1 1/2	1 1/2	1	12	1	12	12	10.04	1.11	9.17	0.32	9.11	1	1	1.29			
H	4 1/2	6	12	1 1/2	1 1/2	1	12	1	12	12	10.71	1	1.71	0.31	3.64	1	1	0.75			
I	4 1/2	6	12	1 1/2	1 1/2	1	12	1	12	12	9	9.1	0.28	0.25	4	1	1	1.79			
J	4 1/2	6	12	1 1/2	1 1/2	1	12	1	12	12	4	5.55	1.64	0.33	0.29	5.68	1	1	0.87		
K	5	6	12	2	2	1	12	1	12	12	7.14	1.14	8.29	0.28	5	1.51	1	1.17			
L	5	7	12	2	2	1	12	1	12	12	3	6.15	1.84	0.25	0.39	3.69	1	1	0.69		
Average												8.430	1.43	2.40	0.275	4.40	1.32	1.015	1.06		

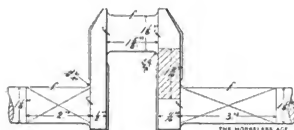


FIG. 1.—CRANK FOR 4x4 1/2 INCH ENGINE.

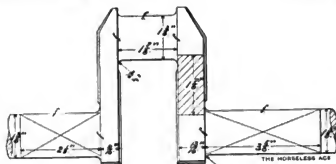


FIG. 2.—CRANK FOR 4 1/2 x 6 INCH ENGINE.

than the other crank arm and crank journal respectively. Now, while the crank journal on the side opposite the flywheel is always, or nearly always, made shorter than the journal on the flywheel side, the two crank arms are nearly always made alike, there being only two exceptions to this rule in the list of crank shafts given above. To obtain the greatest strength with the least metal it is obvious, however, that the two crank arms must be of unequal size. Unfortunately it would seem impossible to obtain a rational basis for a definite ratio of strength between the two arms, and the relation must be determined on an empirical basis. The same applies with regard to the crank journals. It may be said that, although theoretically one of

sure to be constant, the maximum stress on the crank shaft journal transmitting the power depends simply upon the bore and stroke of the engine, and the equation for finding the diameter of the crank shaft journal may be written

$$d' = n \sqrt{s b^2},$$

in which n is a constant, s the piston stroke and b the cylinder bore. The average value of n for the twelve crank shafts about which data were obtained was .275.

Coming now to the length of crank shaft bearings, we find that the average ratio of diameter to length of crank journal on the flywheel side is 1 : 2.5 and on the opposite side 1 : 2. The proportion of average for the two sides is somewhat affected by the

is 1.06. The average ratio of width to thickness of crank is 2.48, or, say, 2.5.

$$w = 2.5t$$

$$2w = 1.06 d^n$$

$$w^2 = 2.65 d^n$$

$$w = 1.38d$$

As the thickness t is smaller than the width in the ratio of 2 1/2 : 1, the expression for t would be .35d. This value it would be advisable to employ if both crank arms were to be made of the same thickness. However, arguments were advanced above to show that it would be advantageous to make the crank arm on the flywheel side heavier than that on the opposite side in the ratio of about 3 to 2. Consequently we shall make the crank arm on the flywheel side of a thickness $6d$ and that on the opposite side .4d, making a combined thickness equal to d , instead of $1.1d$, as with equal arms.

The crank pin dimensions may be obtained as follows: The projected bearing surface of the pin—that is, the product of its diameter by its length—should be proportional to the piston head area or to the square of the bore. The average ratio of the square of the bore to the projected area of the pin was found to be 8.485—say, 8.5—and the average ratio of length of pin to diameter, 1.43. From this we have:

$$l = 1.43d$$

$$8.5 \times 1.43d^2 = b^2$$

$$d = b \div 3.5$$

We have therefore the following formulae for determining the dimensions of any part of a crank shaft:

Diameter of crank pin,

$$d = b \div 3.5$$

Length of crank pin,

$$l = 1.43d$$

Diameter of shaft journal,

$$d' = .275 \sqrt{s b^2}$$

b	s	d	t	d'	l'	l	w	t'	t
4	4 1/2	1.74	1.63	1.14	3.09	2.06	1.58	.69	.46
4 1/2	6	1.29	1.94	1.36	3.67	2.45	1.88	.82	.54
5	5	1.43	2.04	1.38	3.75	2.46	1.90	.83	.55
5 1/2	6	1.44	2.04	1.46	3.94	2.53	2.01	.86	.56
6	7	1.71	2.45	1.74	4.74	3.15	2.40	1.04	.70

DIMENSIONS OF CRANK SHAFTS CALCULATED BY MEANS OF THE FORMULAE.

the journals should be smaller in diameter than the other, in practice it is found expedient to make both of the same diameter, but of different length. One of the reasons for this is that reduction of journal length on the side opposite the flywheel is an important object, as it permits of placing the interrupter, pumps, etc., closer to the engine, and thus renders the whole more compact. Presumably the average ratio of journal lengths at opposite sides of the engine is indicative of the proportional average pressures on these journals, and as all pressures are transmitted to the journals by the crank arms it appears good practice to make the thickness of the two crank arms in the same proportion as the length of the two crank journals.

Assuming the maximum explosive pres-

sure that in a considerable number of the shafts the two journals are of equal length, and we believe that, instead of using the proportions thus deduced, better results could be obtained by using the same total length of bearing and making the flywheel end bearing one and one-half times as long as the other. This would give the proportions:

$$l' = 2.7d,$$

$$l'' = 1.8d.$$

A rule for the dimensions of crank arms is the following:

$$w' t' = n d^2,$$

in which w is the width or larger dimension of the crank arm section, t the thickness of the crank arm, d the journal diameter and n a constant. The average value of n for ten of the cranks represented in the table

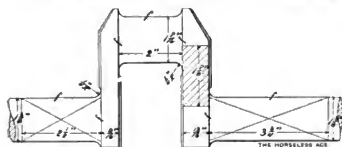


FIG. 3.—CRANK FOR 5x5 INCH ENGINE.

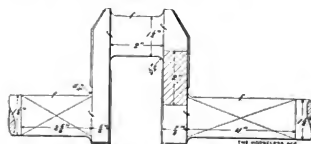


FIG. 4.—CRANK FOR 5x6 INCH ENGINE.

- Length of shaft journal on flywheel side,
 $l' = 2.7d'$
 Length of shaft journal on opposite side,
 $l'' = 1.8d'$
 Width of crank arm,
 $w = 1.38d'$
 Thickness of crank arm on flywheel side,
 $t' = .6d'$
 Thickness of crank arm on opposite side,
 $t'' = .4d'$

The drawings herewith show the dimensions of shafts for cylinders of common dimensions, as calculated by means of these formulæ. Attention is once more called to

the fact that the flywheel and gear are supposed to be both located on the same side of the crank.

The end of the crank arms near the pin is to be rounded to a centre lying in the centre line of the pin. The other end of the arms should be forged with flats for finishing if it is desired to use counter weights.

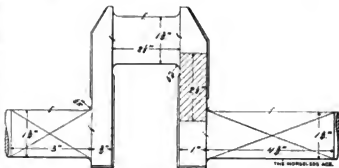


FIG. 5.—CRANK FOR 6X7 INCH ENGINE.

LESSONS OF THE ROAD

Incidents in the Use of a Service Car.

By HARRY B. HAINES.

After having recovered from a broken axle my machine went serenely for about six days. At the end of that time I experienced considerable trouble in turning corners, the differential gears apparently binding. There was nothing to be done but lay the machine up while the rear axle was dissected. This was done, and upon examination of the steel shaft that serves as the axle it was found that the sleeve on which the differential gear rotated had become hot from lack of grease, and had bound, chawing up the axle considerably. It seems that the grease had not worked out of the differential into this most important place, as the designer of the machine had intended it should, and the heating up resulted.

It was necessary to secure a new sleeve, as the old one was badly cut inside, and a new axle was telegraphed for. After a wait of a few days word was received that the manufacturers were so far behind on their orders for new machines that they were unable to give any attention to orders for parts just at present, but would get out some axles as soon as possible and ship them.

This most indefinite promise did not suit me very well, and as the old axle had not been weakened any by the "chewing up" it had received, I decided to have it smoothed off and put back into place.

This was done, the precaution being taken to bore through the differential casting and put on a grease cup that feeds directly on the axle and also bore through the sleeve on the right hand end of the axle and put on an oiler that allows a flow for the necessary lubrication between the sleeve and the axle. Since this has been done I have experienced no further difficulty with the rear axle, and although it is over two weeks ago I am still waiting for the new axle.

It might be interesting to state in this connection that I met the inventor of my

particular make of machine recently and spoke to him about the trouble I had experienced with the rear axles breaking. He told me that several complaints of this same thing had been received at the factory, and upon investigation it had been found that without the knowledge of those in charge a bad lot of stock had been accidentally secured. As soon as this was discovered the stuff was thrown out and another lot secured.

It appears rather to have been the misfortune than the fault of the manufacturers that this occurred, and in justice to them I can state that they have been making the defective parts good, but, of course, with considerable delay, as the major portion of their time is given to getting out new machines.

To come back to home and my machine, the axle was finally put in and the car was about to be released from the repair room when a most obliging mechanic by

A SLIP OF A HEAVY HAMMER

cracked the high speed clutch casting. It was a small matter, but it meant several telegrams to the factory and several days' wait before the casting finally put in an appearance, which was most annoying, to say the least. In this case the makers strengthened the car by substituting phosphor bronze in place of iron in this casting.

When the repair had been completed the machine was propelled under its own motive power outside the door of the repair station. Once there it was noticed that the motor skipped spark, and while the carburetor was being adjusted with the engine running at a high rate of speed there was a sudden roar. Several dark objects flew across the street and when I had recovered sufficiently to investigate I looked under the machine and found the

FAN CASTING SHATTERED

and minus all its blades.

There was no apparent cause for the smashup, but after taking out the floor boards it was plainly seen that the fan blades had struck against the igniter box and had all been sheared off from the casting. This meant no riding until a new fan casting was secured from that far away factory.

Patience being a virtue, I at once became divinely virtuous, and finally, by the

time I was ready to ride again could have given the famous Job "cards and spades" at the waiting game.

For the first day or two the machine went nicely, and then I ventured on a trip to New York city with three passengers and myself in the wagon. We went over in fine shape, covering the twenty-two miles from my house to the Forty-second street ferry in an hour and ten minutes and climbing the famous Kelly's Hill.

On the return trip, after leaving the ferry and starting to climb up on the Hudson County boulevard, the low speed of course being employed, the motor developed a sudden and entirely new knock and seemed to be having troubles of its own that every moment threatened its entire stoppage.

A MYSTERIOUS KNOCK.

I managed to get up the hill and then got out to investigate. Everything was in apparently good shape, the motor running slowly with the gas cut down and exploding regularly, but upon starting off again and throwing in the gears the same knock developed, and I will acknowledge I was at a loss to tell what was the matter.

The noise, I was sure, did not come from the motor bearings or connecting rod, and I finally put it down to an extra heavy explosion of the gasoline, a conclusion which I later discovered was nowhere near the real cause of the trouble.

The home run proved a tedious one, the motor showing signs of distress the whole way, and I was heartily glad when it was completed.

I reached the storage station at a late hour in the evening, and describing the noise I had heard left word for the expert machinist there to diagnose the case and prescribe something for it.

The machine was sent down to my office at noon on the following day in a supposedly repaired condition, but upon starting up the motor I noticed the same knock, only in a much more aggravated form.

I then and there decided to try and find out what the trouble was, although I had my business clothes on and was not prepared to delve into the oily mysteries under the footboards. Notwithstanding this I pulled up the boards, and upon turn-

ing the motor over by hand was surprised, and I may say even shocked, to see the entire cylinder moving up and down at least an eighth of an inch under the bolt that held it on the angle iron frame in front.

The knocking noise was at once explained. I instinctively clutched at my pocket to see whether or not my accident insurance policy was safe, and then got out my wrenches and started in to tighten up the bolt.

It did not take hold at first, but finally, after considerable turning, it gripped the thread on the cylinder and pulled that most important bit of iron back into its original place. The iron lock washer that had held the bolt from slipping around had broken, and this had allowed the bolt to work free.

It did not take me long to get to the repair station, and there the motor was jacked up at the cylinder end and a new bolt and washer were put in place. The old bolt was found to have the threads stripped off near the top of it, but luckily it had not stripped off the threads in the cylinder casting.

I consider that the motor getting loose at the front end was one of the most dangerous things that have happened in my entire automobile experience, and I was pleased to learn a day or so ago that the manufacturers had realized the importance of

A SAFETY LOCK

appliance at this point and had designed one, which I shall get and have put on my car without loss of time.

It is safe to say that not one automobile owner out of twenty knows how to set his valves or time his spark in case either of these most important adjuncts to auto motion should get out of kilter. I have been stalled on many occasions from a lack of that knowledge before I realized how essential it was.

Only last week I had the pleasure of being pushed off a Forty-second street ferryboat at the New York side because the motor would not start, despite five minutes of almost frantic cranking. Strangely enough, the machine had just made a 25 mile run in an hour and ten minutes without a skip or a hesitation of the motor and had stopped promptly and with no indication of heat when I cut off the spark on the ferryboat.

I took advantage of the time used in crossing the river to oil up the machine, as I intended to take a long run up into New York State, and when the landing had been made I inserted the spark plug and tried to start the motor. Much to my surprise it did not respond, and despite all the priming and turning I could do there were no explosions forthcoming.

The deckhands gathered around watching my efforts, and finally, when it was time for the boat to start back across the river, they volunteered to push the machine off the boat and into the ferryhouse.

I climbed into the machine to steer, amid

the hoots of the crowd that had gathered, and four stalwart men backed the machine about 10 feet up the boat and then with a hearty "all together" rushed it down the slight grade to the gangplank, up over the crest it formed, and left me to coast to the street. I steered the machine to one side of the ferryhouse, and requesting my friends to get out started in to ascertain the trouble.

The floor boards and mat came up as usual, and I first took the spark plug out. The points were a bit smoked, but not enough to seriously interfere with their sparking. After cleaning the plug I put it back, and by way of precaution took the cover off the igniter box and tried the adjustment of the two spark points there. These were a little wider apart than the brass rule adjustment called for, and after resetting them I again tried to start the motor and was gratified to have it resume operations after a little turning. I ran very smoothly with the spark and gas cut down, but skipped spark and lost all power when the motor was speeded up. This was sort of a mystery for me, and after half an hour's monkeying I decided to try and make the machine run as far as the agency of the company on West Thirtieth street.

A TEDIOUS SEARCH.

I started off on the low speed and then tried to take the high gears, but the motor skipped so badly that this was impossible, and I was compelled to make my way along slowly on the low gears. I finally reached the station and a mechanic was called down to look at the sparking apparatus. He went all over the wire connections and found them to be tight. The next move was to take out the platinum spark points and grind them down slightly in order to clean them thoroughly. This did not have the desired effect and the carburetor was taken off in order to see whether or not the float inside of it was working properly. This float is composed of tin and once sprang a leak and filled up with gasoline, and in a time shorter than it takes to tell it the machine was out of business as completely as if the engine had dropped out.

The float proved to be all right, but when the carburetor was put on the motor still skipped, and the agent in charge then took a hand in matters himself. It was finally found out that the spring which presses against the cam shaft and drops into a slot, thereby breaking the primary circuit, did not have tension enough, and for this reason caused the spark to come irregularly. The spring was readjusted and the motor started off at the first turn and ran excellently. When I asked what the bill was I was surprised almost beyond expression to have the gentlemanly and genial agent tell me that I did not owe him anything and that he was glad that he had been able to be of service to me. I realized that for once I was not in the hands of the Philistines, and I took my departure, after thanking him heartily for his aid, confident

of the fact that if there were more men like this one the road of touring automobilists would not be filled with so many rough places in the form of exorbitantly expensive repair stations.

CLUTCH STICKS.

A few days after this most interesting experience I set out with a party of three friends to run to Asbury Park, a distance of about 85 miles. Everything went fine until we were pulling out of Elizabeth, when suddenly the motor slowed down and then tried to take hold again, the explosions coming regularly, but the machine bucking and jumping like a Western broncho and threatening to throw us all into the road.

I at once applied the brakes, both foot and emergency, and attempted to pull out the high speed clutch, but found that I was unable to do so. Considerably alarmed at this unlooked for and new development I pulled out the spark plug and as the motor stopped got out to investigate.

Upon putting the starting handle in place and attempting to turn the motor over with the compression open I found that the whole machine went forward and that the high speed clutch had in some manner locked itself. After much struggling I was finally able to pull the clutch lever back to its neutral position, but the gear still remained locked, and despite all my efforts I could not get it loose. I at first thought that it had run hot and dosed it with oil, but to no avail.

The high speed on my machine is obtained by throwing into frictional contact two plates, one of which has on it a circle of round hardwood disks which mesh when the clutch is thrown into position into the other member of the clutch, which is a steel clutch disk having holes bored into it to receive the wooden disks. The adjustment is on the outside, the clutch being turned toward the front of the carriage to loosen it and toward the rear to tighten it. The adjustment when once secured is held by a set nut on the outside that binds on to the main shaft revolving with it.

Although I did not know it at the time, this set nut had in some manner become loosened and had allowed the clutch to slowly wind itself up until it became so tight that the engine did not have power to move it.

It was necessary to get a heavy wrench and a block of wood and drive the clutch adjustment around it until it loosened, and then, after having readjusted it properly, I set the nut up tight and continued on my way. I have not been troubled with the clutch since, although several local owners of the same make of machine as mine have experienced the same difficulty.

TIRE EXPLODES.

My latest misfortune was the blowing up of one of my rear tires a few nights ago. I was riding along a country road at a fair rate of speed, about a mile and a half from home, when suddenly there was

an explosion as loud as that of an 8 pound gun, and for a moment I had visions of soaring up in the air on top of the remains of a gasoline tank. As I was not "hated" skyward I at once stopped the machine, and getting out took off one of the front lamps to investigate.

My first glance showed me the right rear tire flat on the rim, and upon closer examination I found that the tire had exploded, the inner tube having been blown up and the outside shoe having a gash in it at least to inches long.

Still having hopes that the shoe was not utterly ruined, I decided not to run home on it flat, and being fortunate enough to be near a house where there was a telephone, I at once communicated with the storage station in town and asked to have a new rear tire sent out to me. Luckily they were still up and moving, although it was past 10 o'clock, and they informed me that a man would be sent out to my assistance at once on a bicycle. Satisfied with this promise, I returned to the machine, and jacking up the rear wheel started to remove the lugs preparatory to getting the shoe off.

In about twenty minutes I had the inner tube out and found that there was a hole 4 inches long in it. The man from the repair station finally arrived, but had brought the wrong sort of a casing with him. He had to go back for another one, and I sat down to await his return. He came back the second time, and after an hour's work we succeeded in getting the new tire on, and started home, arriving at the station shortly after midnight. I have since sent the tire and inner tube to the manufacturers, and they have acknowledged a defect and signified their intention of replacing the blown up tire with a new one.

From a Lady's Automobiling Experience.

By MRS. WELLINGTON MATHER.

When I announced my intention of purchasing and operating a gasoline runabout my friends looked at me with amazement, not unmixed with pity. But my immediate family offering no strenuous objection, I pursued my hazardous course and became owner of a pretty little gasoline vehicle, with an engine of the single cylinder, 4 horse power type.

The machine was brought down my driveway, a 20 per cent. grade, and delivered to me in my little "shop," where I had already installed my tool chest and bench.

I proceeded to look over the motor, and really, if one of the powerful engines belonging to any of our great railroad systems had been given me, and I had been invited to sit down and play with it I would not have been more nonplused.

I was able to recognize the flywheel, knew what the cylinder was, knew what the tanks were for (they were labeled), and seemed to recognize a quantity of garden hose.

Realizing the enormity of my ignorance I hied me to the local repair shop, where, through the kindness of the machinist, I was enabled to spend two days and a half taking apart and putting together an engine similar to my own.

I left that shop with some considerable knowledge of my machine and was the better able to make an intelligent study of the instruction book furnished with the vehicle.

I remember it particularly speaks of four simple little bolts, easily removed, that hold the engine to the angle iron frame. I spent just seven hours and a half at hard labor getting down to those "four simple little bolts." I had the place quite covered with wire, hose, bolts, nuts, tanks, wheels, transmission gear, etc. I admit that said bolts were easily removed when I finally reached them.

I now felt capable of running my machine and enjoyed many a delightful spin about the town, occasionally marred by the crowd of urchins that would gather around me, always on the main street, while I cleaned the sparking plug—I had not then become accustomed to regulating the gasoline.

My next concern was the emergency brake. If in descending my steep driveway my chain should break, or I should otherwise lose control of the machine it would mean certain disaster. I made careful study of the brake operating directly upon the rear axle, and found it connected with the clutch by a simple "clothesline wire," and upon working it found it pulled directly across the carburetor. I did not approve of this, so had the brake shoe shortened about an inch and a steel rod, connecting with turnbuckle, substituted for the wire. Robbing the bathroom of sufficient hose I made neat washers, with which I encased the rod to render it noiseless.

My first mishap was the bursting of the gasoline pipe connection. Fortunately, this happened not far from home and I was able to make a temporary repair with a piece of rubber hose carried with my repair outfit for just such an emergency.

I procured from a plumber a length of seamless tubing, and using the "union" from the old connection, I descended into the pit, built under the machine in the floor of my shop. After four hours' hard work I ascended with aching wrists and blackened hands, but with the proud knowledge that those joints were properly packed and would leak no more.

I have made some delightful cross country runs, frightening many horses, but with no mishaps, the longest run being 164 miles.

On these long runs I was greatly annoyed by a stiffness in the third and fourth fingers of my left hand, caused by a slight vibration in the steering lever. This was entirely obviated by the use of a patent grip of soft rubber, ordinarily used for bicycle handles.

I have run my machine 1,600 miles, but have as yet had no trouble with my double

tube tires. It is my custom after having tires washed to carefully go over them, pulling out nails, tacks, bits of glass and rock that have become embedded in the rubber, thereby, I think, saving many a puncture.

I take entire care of my machine, allowing no one else to touch it.

It is my great pleasure to take my scoffing friends for a merry spin and bring them back converts to the joys of automobiling—"with mother at the helm."

The Endurance Run Route.

As already announced in THE HORSELESS AGE, Secretary Unwin, of the N. A. A. M., and C. H. Martin are making a trip of exploration over the route of the proposed endurance contest. They started from New York city on July 12, and followed the Blue Book route up the Hudson River to Kingston, via Tarrytown, Peekskill, Mattewan and Poughkeepsie, crossing the river at Rhinecliff. The roads so far are good, but the ferry is likely to cause considerable trouble in the contest. This first part of the route, except crossing the river, is identical with the first part of the route of the New York-Buffalo endurance contest in 1900.

From Kingston the journey was continued to Owego, via West Hurley, Pine Hill, Summit, Delhi, Fleischmanns, Arkville, Margueriteville, Dunraven, Unadilla and Binghamton. Unadilla is considered as a night stop. It has three hotels and could possibly accommodate 200 persons. The roads in the first part of this route, through the Catskill Mountains, are narrow and stony, but fairly passable in dry weather. Grades there are plenty in number and some that will tax the hill climbing power of the machines. Although there are some macadam roads on the route, by far the greater distance is dirt road, and some sandy roads are met with.

Licensed Association Affairs.

The Association of Licensed Automobile Manufacturers, by the warnings against infringement of its patents which it is now placing before the public, shows an intention vigorously to uphold the rights that it claims to possess under the Selden and other patents controlled by its membership.

In justification of the stand it is taking, the association claims that its members are pioneers in the industry, and have commercialized the gasoline automobile by many years of development and at great cost. They further state that 90 per cent. of all American machines have been made by them, and that their output now keeps pace with the existing demand.

A meeting of members will be held at Niagara Falls, August 14 and 15, at which the policy and affairs of the association will be discussed.

TOURING IN

~ ~ AMERICA.

V.—Long Island.

By C. H. GILLETTE.

(Concluded.)

The central section, which lies along what is generally called the "backbone of the island," is the "undiscovered country" for tourists. Taken all in all, it shows the greatest diversity of scenery, and from it cross roads can be taken to points on either shore at several places. It is safe to predict that the central section will be the touring ground of the future.

It is unfortunate that there is no direct road suitable for automobiles through this central section from west to east. It will have to be undertaken and explored from the cross routes which run north and south. I cannot imagine a more delightful tour than that from west to east along the whole length of the island, zigzagging from shore to shore on each of these interesting cross roads. There are not many of them, and toward the eastern end they are far apart.

The first of these cross roads is from Glen Cove, on the Sound, through Roslyn, Mineola, Garden City and Hempstead to Freeport or Rockville, on the ocean side. At Garden City is the famous cathedral, and, what is as important to the seasoned tourist, the Garden City Hotel, noted among automobilists for the especial welcome extended to them by the enthusiastic proprietor, Mr. Lannin. There are still some hotels which look askance at the automobile and are not overanxious to offer facilities for its care. There are altogether too few that really offer good accommodations, and when we do find one

that knows what is wanted, it is a pleasure to tell others about it, that they may avail themselves of its conveniences.

Parthenetically, it might be observed that among other exceptions to the general rule with regard to Long Island hotels are the Shore Inn, at St. James, kept by the former variety actor, Tony Farrell, which is exceedingly popular as a bohemian resort, and the new Inn at Wardenclyffe.

Not far off from this route is Lake Success, which can be best reached from Glen Cove on the north side. Another route is by way of Garden City through Hyde Park. All the roads are macadam on the way to Lake Success. The lake itself is on the Vanderbilt estate and much publicity has been given to this body of water lately on account of an attempt of the owner to close the roads leading to it, as far as tourists are concerned. The matter has been threshed out in the courts and it has finally been decided that it is impossible to take away from the American public the privilege of an open highway and a view of any body of water which has such an approach.

A second delightful cross trip is from Huntington through Hicksville into Amityville. The road lies through Central Park and Farmingdale, and while it is hilly the grades are long and easy, the roads are shaded, and altogether the conditions are such as to make touring an unqualified delight.

Another cross route is a little further east from Huntington by way of Melville, keeping east of Farmingdale, into Babylon on the south shore. The roads here are not macadam, but they are dirt roads of the best description and easily covered by automobiles.

A third run into the centre of the island (which is really a part of the best north shore route) is from East Northport

through Commack to Smithtown. At Smithtown is the Riverside Inn, one of the few modern hotels in the central section, or the north side of the island.

Lake Ronkonkoma is well worth a side trip. More tourists should know this lake than do. It is a clear blue pond of pure water, which analysis shows to be the same as that of the celebrated Poland Spring water. It is the highest body of water on the island, with the exception of Lake Success, and is very nearly the highest altitude reached on Long Island. It is therefore evident there is no inlet to Lake Ronkonkoma and there is just as certainly no outlet to the lake. Yet it rises and falls periodically as if governed in some mysterious way by geological conditions unknown to the human. There was a story extant for many years that the lake rose and fell during a period of seven years, but a Long Islander who has watched it carefully for nine years says that it does not do anything of the kind. Close observers claim to have discovered that the rise in Lake Ronkonkoma is coincident with the rainfall in Vermont. Scientists have a theory that it has its source in the Green Mountains and that the water is carried through crevices in the rocks underlying Connecticut and Massachusetts and under Long Island Sound, to bubble up in the centre of Lake Ronkonkoma with such force that even a deep sea sounding apparatus loaded with lead will not sink in the boiling waters. Another belief which prevailed for many years was that the lake had no bottom, but it was found by the use of the deep sea sounding apparatus that it had an average depth of 98 feet, except where the waters rose in the centre.

These facts and theories are not its greatest charms. The country surrounding it is beautiful. Foliage, trees and wild flowers



HUNTINGTON VALLEY; SEEN FROM THE EAST. HUNTINGTON IS RICH IN HISTORIC MEMORIES.



THE NORTH SHORE ROAD, WHICH WINDS THROUGH SO MANY QUANT AND BEAUTIFUL TOWNS.



THE SHELL ROAD AT COLD SPRINGS. ONE OF THE SHELL ROADS OF LONG ISLAND, PROBABLY AS GOOD AS ANY IN THE COUNTRY FOR AUTOMOBILING.

are bewitching in their beauty and the scenery in this vicinity is delightful. It can be reached from St. James on the north very handily. From the Sound there are two routes, one from Sayville and one from Bayport. Neither is a good route, both being sandy and heavy.

The next available cross route is that from East Quogue through Riverhead to Mattituck. This is a fair dirt road, and although somewhat hilly, is not difficult. From Mattituck on to Greenport is as pretty a run as is to be found in the entire East.

There is but one more crossroad, that from Bridgehampton through Sag Harbor and Shelter Island to Greenport. This run

is almost level, but rather poor, particularly in the neighborhood of Sag Harbor.

From Greenport a steamer runs to New London, Conn., which can carry automobiles conveniently. This makes an eastern entrance to the island for tourists. Several tourists have come from Boston lately by way of Providence and New London and, crossing there to Greenport, have taken the South Shore road to New York. This route is bound to become popular with those who have already tried the Connecticut routes.

Long Island, except at the western end,

is not by any means the easiest touring ground in the Eastern States. There are hills, and plenty of them, and some poor roads; but, taken as a whole, it is more than worth the while. We have all heard so much about the western part of the island that we imagine we know all about it. A few days spent in the central and eastern sections will show us that our previous ideas of it were all wrong and that there is plenty of interesting and profitable touring to be done in this comparatively small territory.

The Irish Fortnight.

On Thursday, July 9, the automobilists sojourning in Ireland journeyed from Dublin to Cork in order to carry out that part of their program arranged for the South of Ireland. The cars, numbering about forty, adopted various routes, but the majority of the travelers drove straight through to Cork by the shortest way. The weather was very favorable, the roads were good and everywhere the motorists were well received by the people.

Large crowds of spectators gathered along the route, having come from all parts of the South and Southwest. The crowds were exceedingly well behaved. The number of automobilists in Ireland was now rapidly thinning down, as the events clashed with the Ostend tournament, and a large number of the leading cars had gone to the Belgian resort. Many had been three weeks in Ireland and were desirous of finishing off, and the abandonment of the hill climbing trials at Killarney was proposed.

On Friday there were speed trials for racers and tourists' cars at Cork. The pro-

jected eliminating trial for motor launches was abandoned, owing to lack of entries.

The road over which the races took place at Cork lay immediately beyond the city boundary, and had a capital surface. In the racing section remarkably good times were accomplished. The French and German cars continued to monopolize attention. All the Napier racers had left Ireland, and the Wolseleys were the only British racing cars remaining. A very interesting race was provided by the Hon. C. Rolls and the Hon. Scott Montagu, which was the most exciting event of the day, the latter winning by only 4 yards on the whole 2 miles course.

In the evening a procession of the cars was made to the Cork International Exhibition, where the Lord Mayor presented the prizes.

THE RESULTS.

Tourists' section (open handicap) for the cup presented by the corporation of Cork—J. Warren Gardner (Serpellet 6 horse power steam car), handicap 50 seconds, net time 2m. 7.4-5s.

Racing section for cars under 650 kilos—

Brunt (20 horse power Prunel) only competed; time, 2m. 40.4-5 s.

Racing section for cars under 1,000 kilos—Hon. C. P. Rolls (80 horse power Mors), winner; time, 1m. 59.3-5s.

Individual match—Hon. Scott Montagu (22 horse power light Daimler) beat the Hon. C. S. Rolls (20 horse power Panhard).

The club decided to proceed with the Killarney events.

The last of the events in the Irish Fortnight was the hill climbing trial on the Killarney-Tralee road for the County Kerry cup on Wednesday, July 15. It had been raining all day the day previous to the trial, so that the road surface was very greasy, and the trial course was therefore shortened from 1 mile to 1,200 yards. The attendance was only small, and it was manifest that the Irish automobile events had been drawn out too much. Nine cars ran in the hill race, and the final heat was between an 80 horse power Mors, driven by C. S. Rolls, and a 22 horse power Daimler, belonging to A. J. McDonald. The Mors won in 1m. 1.4-5s.

Maintenance and Repairs.



XI—Battered Sliding Gears—Rebushing Transmission Bearings.

By W. O. ANTHONY.

The sliding gear system of transmission, which originated in France, is very satisfactory, except in one respect—the gear teeth are certain to batter up more or less in changing from one speed to another, especially in the hands of a novice. In the latest systems this difficulty is largely overcome by making all gears of tool steel and hardening them, and beveling the ends of the teeth. This bevel form permits of the gears being shifted more readily and with less liability of their "clashing."

In many of the older systems, still in use, the gears were either all of soft steel or one set of this material and the other of tough bronze. This latter combination possesses the advantage of great durability under ordinary conditions or where the teeth of gears are always in mesh, but is wholly unsuitable for a sliding gear transmission.

If the ends of gear teeth in such a transmission begin to batter up and are not at once attended to they will finally get so bad that they cannot be shifted at all, because the ends will become hooked over, as shown in Fig. 30, in which the dotted lines show the original form of the teeth at the ends, and these projections will finally almost close the space between ends of teeth.

With most forms of case enclosing the transmission gearing, gears in such condition may be fairly well repaired without removing from the case, by working upon them through the cover in the top of the case. With a cold chisel having its cutting end formed as shown in Fig. 31 the hooked ends may be cut down quite clean, finishing, if this seems necessary, with a small, fine file. In making repairs upon a job like this it is advisable to cut down the ends of all the teeth, whether this was the form originally given them or not. They should be beveled upon both faces of the ends which come into engagement with one another during the operation of shifting. In one machine employing sliding gear transmission and bevel gear drive (with universal jointed shaft) one of the bronze bushings is apparently subjected to excessive wear, and becomes very loose in an unduly short time. A method of repairing this bushing very readily, saving the delay usually incident to securing a new one, is therefore described, and this same method is, of course, applicable to other similar bushings. It consists in chucking the old bushing true in the lathe and boring out the hole to a diameter about three-sixteenths inch larger than the original. This will allow for a sufficient thickness of metal for the liner of phosphor bronzes to be fitted into

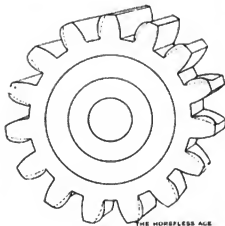


Fig. 30.

the new bore. From a rod of hard, tough phosphor bronze, or a casting of this material if one of the right size is at hand, cut off a piece very slightly longer than the old bushing. Bore this out to fit the shaft, a nice running fit. Now mount upon a mandrel and turn up to fit the bore in the bushing, an easy driving fit. With a blow torch and a soldering iron tin the inside of the bore and the outside of the liner, keeping them both hot enough to melt the solder, and force them together between the jaws of a vise. This makes a strong joint and the bushing is as good as new.

The oil hole should now be continued through the liner and an oil groove cut nearly its whole length.

In the absence of a planer or shaper this latter operation may be very quickly and nicely performed on a lathe, and in other classes of work small key seats may be cut in the same manner.

The bushing or the hub of a gear wheel or pulley, if key seating is to be done, is held true and firmly in a chuck and locked against accidental turning by throwing in the back gear of the lathe. A tool must now be made having a shank of cold rolled round steel one-half or three-quarters inch in diameter or, as a rule, as large as the hole will accommodate when the cutting tool is in position. About one-half inch from one

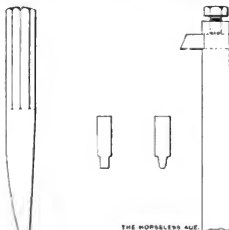


Fig. 31.

end of this piece (which should be 6 or 8 inches long) drill a one-quarter inch hole clear through. Into this same end drill and tap a hole for a one-quarter inch set screw. Grind one end of a piece of three-sixteenths inch square self hardening steel to the width and shape desired, this latter being round upon the end for an oil groove, and square, with slight clearance, for key ways. The self hardening steel should now be cut off to the required length, which is enough to allow the cutting edge to project about three-sixteenths inch. This tool complete is shown in Fig. 32. The two small sketches in this figure show the cutters for oil grooves and key seats respectively.

A way of cutting off this self hardening steel to avoid waste is by heating to a dull red at the point to be cut and with a chisel nicked the four sides slightly. Then grip in a vise with the nicks in line with the top of the jaws, and by grasping the piece with a wrench close to the jaws and prying slightly it will break clean and sharp. This is much more economical than grinding on the edge of an emery wheel, as is usually done.

To proceed with the cutting of the oil groove:

Having fastened the bushing firmly in the chuck, put the cutting tool in the tool post, having the cutter in such position relative to the holder that it will cut when the tool is pulled out or toward the tail center, as it will chatter if the cutting is done in the other direction. The slide rest is operated by the handle and at each cut the cutter is fed into the work a little deeper by drawing out the slider upon the slide rest. It seems needless to add that the cutter should be held opposite to the centre of the hole in the bushing and in a direction radial to it.

Test of Motor Delivery Wagon.

A large department store in Boston on Monday of last week made some tests with one of the new Knoxmobile delivery wagons. A considerable saving in time was shown over horse delivery and the firm expressed themselves as well pleased with the performance. Following is a record of the day's work and of time saved in the different trips, as compared with a horse delivery wagon doing the same work with a change of horses in the afternoon:

Trip.	Distance Miles.	Stops	Wt. of Load. Lbs.	Time Saved— Hrs. Mins.
First....	634	14	75	20
Second..	844	47	300	1 31
Third...	244	25	240	3

A recently received instruction book of a touring car manufacturer contains this caution: "Do not get the idea that you must run at full speed all the time; it shortens the life of your car and you may shorten other lives. One-half the maximum speed of the car is a violation of any automobile speed law in the United States."

-COMMUNICATIONS-

Steering Pivots.

Editor HORSELESS AGE:

Do not overlook the fact that the primary incentive to the readoption of the so called Elliott type of steering pivot by the makers enumerated in your editorial of July 15 was the demand for extremely low hugging cars, and has nothing to do with the relative mechanical merits inherent in the two forms of construction.

As a matter of fact, in order to secure the advantage of a low front axle, the clever mechanics employed by the manufacturers to whom you refer have succeeded in applying to the disadvantages of the Elliott type the very palliatives described by you.

As to the question of standardization: The possible legal limitation to the number of gasoline automobile manufacturers makes it a matter of secondary importance. As a result of the wholesale adoption of the Elliott pivot some years ago by makers of light steam cars, the forgings for it are carried as standard by many manufacturers; but the Lemoine pivot forging is today equally available for light vehicles, while the only standard axle pivots of the larger sizes are of the Lemoine type.

After much experience with both types the writer's own preferences are strongly in favor of the Lemoine. He is prepared to concede that in relatively light rigs with powerful steering gear two different opinions might be entertained in regard to them, according to experience. But there is no uncertainty in his mind whatever concerning steering pivots for the heavier cars.

HAYDEN EAMES.

The Whitman Transcontinental Expedition.

ELKO, NEV., July 20.

Editor HORSELESS AGE:

Myself and friend, E. I. Hammond, are trying to make the trip from San Francisco to New York in a regular 1903 Oldsmobile runabout. We left San Francisco on July 6 and got along to this place very nicely. We have had some slow work in the awful sands and sage brush of Nevada, but we use large canvas sand tires which we rope to the wheels when we get into sand so deep our rear wheels spin. These give our wheels a 6 to 8 inch tread and the car then rides the sand. We have only had to use these to any extent at Wadsworth and Winnamucca, where we encountered 6 to 8 miles of sand drifts 8 to 10 feet high. By using these canvas tires and rope on the wheels we struggled through. The roads here are simply trails in the brush. Our axles strike the high stumps between the wheel tracks and we are often hung up and have to dig out.

We got lost one day and ran 50 miles in the wilderness, where there was not a drop of water or living thing, only the everlasting sage brush, jack rabbits, coyotes and rattlesnakes. On the Humboldt Sink we saw large bands of wild horses. We crossed alkali deserts of 20 to 30 miles. The mirage looked like a lake of water around us in the distance. That day we crossed 40 miles of desert and did not meet or pass a living soul.

We always take canteen water and sometimes a lunch, in case of breakdown on the deserts. One night we had to run in brush till 12:30 by our lamps. At 10 o'clock we stopped and ate a sandwich and drank from our canteen. That day a bad break would have meant a 25 miles walk to the nearest station. Two cowboys showed us the way across the Humphrey ranch, where otherwise we would have had trouble on account of there being a river to cross. Here we ran

5 miles across the country, simply following the cowboys who lassoed our machine and helped us ford the main Humboldt River, at a cattle crossing where the banks were very steep. This ranch contained 160,000 acres and 11,000 head of cattle. It extends 50 miles in one direction.

We stop here today to rest and do a little work on the machine. We have proceeded leisurely and taken many pictures. We feel quite satisfied with our progress, as we are not trying for fast time. From here we go to Ogden and Salt Lake.

L. L. WHITMAN.

Explosive Engine Queries.

LOS ANGELES, Cal.

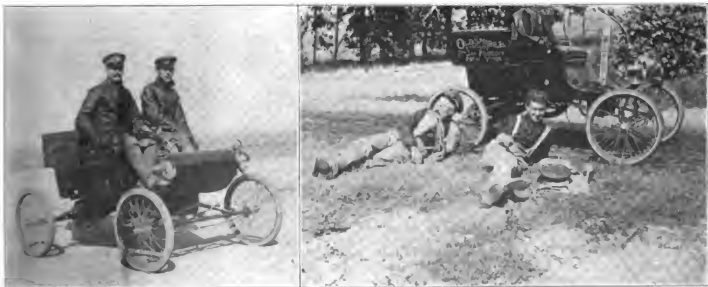
Editor HORSELESS AGE:

Would not the power of an engine with two pistons, driven apart by an explosion taking place between them, and with a charge of gas sufficiently large to act with the greatest efficiency upon the surface of both pistons at the same moment, be double, or nearly double, the power of an engine with one piston of the same size driven from a stationary cylinder head by the explosion of a charge of gas half as large as that used in the two piston engine?

Would not the two piston engine really be very much like two single piston engines, but with the great advantage that only one set of valves and igniters need be used, and that the explosive shocks, acting at the same moment and in opposite directions on the two pistons, would greatly balance each other?

Kindly enlighten some of your readers on this subject. AN OLD SUBSCRIBER.

[The power of a double piston engine of given cylinder bore and given stroke for each piston would be fully double the power of a single piston engine of the same bore and the same stroke as one of the pistons in the double piston engine. An engine of this type is, of course, better bal-



L. L. WHITMAN AND E. I. HAMMOND ON THEIR TRANSCONTINENTAL TOUR.

anced than a single cylinder engine, but there is practically no difference in this respect when compared with a double opposite cylinder engine. On the other hand, the double opposite cylinder engine, firing alternately, requires only one-half the fly-wheel capacity, as the double piston engine of the same dimensions (bore and stroke) is somewhat more compact, does not require the complicated crank arrangement, and has the further advantage that if one cylinder should fail for some reason the other will still work. So far as we know there is now only a single double piston engine for automobiles manufactured in the whole world, while at least a dozen prominent concerns manufacture double opposite cylinder engines.

There are three possible causes of vibration in an engine, viz.: Unbalanced rotating parts, unbalanced reciprocating parts, and torque reaction. The latter may be ex-

when the secondary wire is attached to the plug, or by holding the secondary the proper sparking distance from the top of the plug when connected to the engine, but I do get a sort of silent discharge which can be indistinctly seen.

The batteries are nearly new, and are strong enough, because I can get a big, hot spark when the secondary is held to the engine anywhere else but to the sparking plug.

I have four different sparking plugs, two of them brand new, the other two just re-insulated, and all properly cleaned; all of these are supposed to be first class plugs.

My coil is a Splitdorf and almost new. Same is properly cleaned on contact points and end of magnet.

My puzzle is that I can get a spark a quarter or a half inch long if desired anywhere except where it is most needed.

Sometimes this thing bothers me so I

Can Tire Treads Be Renewed?

Editor HORSELESS AGE:

Having used an automobile for three years I have accumulated a number of tires which have succumbed from various causes. It occurs to me that some of them would be good for service if the outer covering could be renewed. I have one tire which shows the fabric bare around the entire circumference and yet has never been punctured. Do you know if any of the manufacturers of tires make a specialty of this line of work and what proportion of the first cost would replace outer rubber coating?

H. S. B.

[A certain French tire firm makes a specialty of renewing the tread portion of (their own) tires. We do not believe that any American tire manufacturer renews treads, but if there is any firm doing work of this kind we should be glad to learn its address.—Ed.]

The French Extra-Parliamentary Committee.

Reports will be made to the technical sub-committees of the extra-parliamentary committee on automobiles appointed by the French Government, as follows:

On the question of maximum speed limits MM. Mors, Michelin and Depasse will submit their reasons against any definite limits; and MM. Coutant, Breton, De Dion and Walkener will advocate legal speed limits varying between 25 and 38 miles per hour. Possible mechanical means for preventing too high speeds, based, for instance, on the normal rotative speed of the motor and on the transmission, and means for verifying the text of the declaration receipt of the manufacturer will be reported upon by MM. Renault and Perissé. Other reports will be on the following subjects: Speed tests on public roads; accidents due to tire bursts; steering mechanisms; chronometers and speed measuring apparatus; identification numbers and plates; noise and remedies therefor in connection with automobiles and motor cycles; prevention of obnoxious odors; prevention of visible steam; brakes; means connected with the vehicle for preventing raising of dust; tarring and oiling of roads; newly macadamized sections and other inconveniences of roads; railroad transportation of automobiles; fire risks in connection with automobiles.

In the competition of motor fuels organized by the A. C. F., which started on July 15, all the competing carburants will be tested on two different types of motor, one a single cylinder Gillet-Forest (coupled to an electric generator capable of an output of 8 kilowatts), the bore being 140 millimetres and the stroke 170 millimetres, the number of revolutions being 850 per minute. The other motor employed will be a De Dion-Bouton (coupled to a 3 kilowatt dynamo), having a bore of 84 millimetres and a stroke of 90 millimetres, and running at 1,600 revolutions per minute.



RALPH LYON AND HIS AUTOMOBILE STABLE AT HYANNIS, MASS.

plained as follows: With the same force that the explosion tends to turn the crank in one direction it tends to turn the cylinder in the opposite direction; and if the crank was fixed and the cylinder free and had suitable connections for the admission and ignition, the cylinder would rotate instead of the crank. The moving parts can be perfectly balanced in a double piston engine, and the only cause of vibration in such an engine is the torque reaction. Since in a double piston engine the force of explosion is twice as large as in a double cylinder single piston engine of the same size, the torque reaction is twice as great in the former as in the latter.—Ed.]

Ignition Queries.

Editor HORSELESS AGE:

I have what seems a puzzle to me in the line of ignition of gasoline engines. At times I am unable to get a good spark

can scarcely adjust vibrator on coil so the engine will not skip every few explosions.

Also, will you please tell me which instrument is the proper one to use for testing the dry batteries such as are ordinarily used—the ammeter or the voltmeter?

R. C. BROWN.

[A silent discharge would point to short circuits in the plugs. It is more likely, however, that the trouble is farther back, in the battery or interrupter. The compression greatly diminishes the volume of the spark, and that you get a good size spark outside the engine does not prove a spark of sufficient size in the compression space.

Either an ammeter or a voltmeter will do for testing dry batteries, but if a voltmeter is used the reading should be taken while the battery is sending current through the coil. Otherwise the reading will not be conclusive as to the state of the battery.—Ed.]

Club Notes.



New Clubhouse for A. C. of Pittsburgh.

Plans for a new clubhouse for the A. C. of Pittsburgh have been drawn up by architects Vrydaugh & Wolfe, and approved by the club committee having the work in charge.

The location is in the fashionable East End, at the intersection of Baum and Beatty streets, convenient to the residence portion of the city and within a stone's throw of the three automobile repositories. There is a one story building on the premises now. It was erected by the owners of the property for the Seely Manufacturing Company. The owners will immediately erect another story, which will have meeting, committee and lounging rooms, men's lockers and shower baths, grill room and kitchen, ladies' parlor and lavatories. The first floor will be used for storing cars of members and have a charging plant, but no machine shop. As the property is 76x74x52 and 16 feet (where the two converging and intersecting streets approach), the clubhouse will have ample room for commodious quarters.

The whole structure will be devoted to the purposes of the club. The owners will expend about \$10,000 on improvements, and have given a ten years' lease to the club from April 1 next. The club itself will furnish the clubhouse most luxuriously. The work will be pushed, and the club expects to be in its new home long before the holidays.

It was only last January when a few motorists got together for the purpose of effecting an organization which would have among its objects the furtherance of the interests of automobile owners. The organization began its corporate existence early in May, and has now nearly 200 members, with new ones coming in at the rate of thirty to forty a month. There are a great many automobiles owned in Pittsburgh, and the club will almost be a millionaire's club. The matter of providing a clubhouse for the club is in charge of a committee composed of Reuben Miller, Jr.; W. Linford Smith, W. L. Elkins and George L. Hailman.

MUSCATINE A. C.

An automobile club is proposed in Muscatine, Ia.

KALAMAZOO A. C.

L. D. Cooley, of Kalamazoo, Mich., is promoting an automobile club in that city.

A. C. OF PITTSBURG.

An 85 mile endurance run to Butler, Pa., and return is under discussion by the Automobile Club of Pittsburgh. The club is also considering a series of races to be held on the Brunots Island track.



FACADE OF NEW CLUBHOUSE OF A. C. OF PITTSBURG.

DAYTON A. C.

The Dayton Automobile Club, of Dayton, Ohio, is planning the erection of a clubhouse.

WORCESTER A. C.

The Worcester Automobile Club, of Worcester, Mass., held a banquet July 16, at which automobile legislation was thoroughly discussed.

A. A. A.

The compendium and digest of the automobile laws of various Eastern States, recently distributed by the Automobile Club of America to its members, has been reprinted and sent to all members of the Automobile Association of America.

A. C. OF BUFFALO.

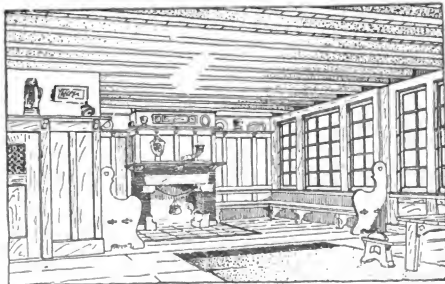
The Automobile Club of Buffalo has just held a special meeting. The new automobile law of Ontario, Canada, was one of the most important matters considered.

TOLEDO A. C.

At its meeting July 18 the Toledo Automobile Club, of Toledo, Ohio, gave considerable time to a discussion of automobile legislation.

A. C. A.

Contrary to various rumors it is asserted at the club headquarters that the Automobile Club of America has not arranged for a fall reliability run from New York city to Lenox, Mass.



GRILL ROOM OF A. C. OF PITTSBURG.

The Races at the Empire City Track.

In the series of races on the Empire City Trotting Track, at Yonkers, N. Y., July 25, many automobile records were broken. The meet was attended by nearly 6,000 people, fully 1,000 of whom came to the track in automobiles. Over 300 machines—worth not less than \$1,000,000 and ranging in value from \$375 to \$12,000—were grouped about the grand stand during the afternoon.

Weather conditions could not have been better, although the day was fairly hot. There was scarcely a breath of wind, and no rain. The track, while somewhat dusty, and not banked high enough at the turns for automobile racing, was otherwise in excellent condition, as the many new records attested. It had been especially prepared for the occasion, and, just before the first race, was finally gone over with a road roller, preceded by a sprinkler.

From a spectacular standpoint it would have been difficult to have contrived a more exciting exhibition of daredevilism and record breaking than the various races afforded. There was throughout all that the most blasé could desire in the way of speed and thrills.

For the discriminating observer, seeking practical value in his entertainment, there was also much of interest. One significant fact was that in all the races there was practically nothing to chronicle in the way of breakdowns; another was the presence of so many visitors' machines; while the

fact that of these last, over 300—most of them machines of thoroughly commercial types—not more than one or two broke down during the day's travel, was probably of more real importance than all of the racing.

The races were not in all cases pulled off according to program, and for various reasons a number of the contestants failed to appear. On the whole this was well, for had everything scheduled been run the afternoon would not have been long enough to finish in. As things were, it was well after sunset before the last trial was over.

The first event was a 5 mile race, open to machines of any power, weighing less than 1,200 pounds. A 16 horse power Darraq, driven by L. O. Gitchell; a 4 horse power Orient buckboard, driven by J. C. Robbins; a special 12 horse power machine, built and driven by F. A. La Roche; a 6 horse power Northern, weighing 800 pounds, with F. F. Goodman as operator, and a 10 horse power Franklin, stripped to 900 pounds and piloted by J. Wilkinson, lined up for the start. Nine other entries failed to show up. It was planned to run this race in two heats and a final, but because of so many entries not appearing, it was finished in one heat. With one exception, the contestants were away in good shape from a flying start, a corps of timers catching them as they passed under the wire. The Northern, a skeleton chassis, would not start, owing to ignition troubles, it was said. The Franklin took the lead from the beginning, and drew well

ahead of the field, winning the \$100 silver trophy in 6 minutes 54.3 seconds, and setting new world's records for its class. Its average speed was nearly 44 miles an hour, and its fastest mile was done in 1:22. The Darraq took second prize with a time of 8:00.4-5, and was closely followed by La Roche in 8:11.2-5. The little Orient buckboard, weighing but 400 pounds, was last, although it finished perfectly in about 8½ minutes, having maintained an average speed of over 35 miles an hour.

The second event was the sensation of the day. Almost before the spectators realized what was happening, the track was cleared and Barney Oldfield, in his freak racer, was ready for a flying start against the mile track record. So recklessly as to hold every eye at the track transfixed until the trial was over, he sent his ponderous machine under the wire with a flash and roar that suggested fast express trains passing in a tunnel. There was only time to see that he was keeping close to the outer fence of the track, when a blinding cloud of dust hid him from view. As it quickly lifted, he could be seen skidding around the curve at the quarter in a manner so obviously dangerous as to draw a spontaneous groan from the crowd. The machine straightened out, however, and passed like a tornado through the second and third quarters, raising dust like the trail from a rocket, and running at the rate of 102 feet a second—70 miles an hour. The turn to the homestretch was skidded around in the same hair raising manner, and then the



GENERAL VIEW OF THE TRACK AND THE LAWN IN FRONT OF GRAND STAND.

mile was finished almost while the spectators still held their breaths. The announcement of the time—55.45 seconds, a new world's track record—broke the tension and was hailed with a vast tooting of auto horns. It was a great exhibition of recklessness for those who care for that sort of thing.

The third event was a to mile match (flying start) for a silver cup, and was contested by the 10 horse power Franklin which won the first race, and a 10 horse power Renault, driven by Jos. Tracy. The 6 horse power Northern which had been entered was not ready to start. Again the Franklin won in easy fashion, leading from the start and incidentally making new records from 6 to 10 miles, inclusive. Time, 15:15.15. The Renault finished a third of a mile behind.

The fourth race was a 15 mile flying start match between three machines, one each of American, French and German manufacture. The entries were the 80 horse power Gordon Bennett Peerless, with Charles G. Wridgway as driver; a 40 horse power Decauville, in charge of Henri Page, and a 60 horse power Mercedes, run by Laurent Grosso. Although closely contested the Mercedes upheld its racing reputation by humming smoothly and rapidly along, reeling off mile after mile at a rapid, even gait, winning in 10 minutes 10.45 seconds—3 minutes better than Fournier's record for the distance. A notable feature of the Mercedes' performance was that it never skidded at the turns—a fault of every other machine at the meet of anything like equal speed. Whether this was due to better distribution of weight, or to some other factor, was not apparent. The Decauville, considering the difference in power, ran a good second, finishing in 10 minutes 54.4 seconds. The Peerless brought up the rear, nearly a mile behind the Mercedes.

In the fifth race—a 10 mile flying start event, open to all machines under 1,800 pounds—there were eight entries, of which four started. The four were, with their drivers, a 35 horse power Panhard, 1,650 pounds, Joseph Tracy; a 40 horse power Decauville, 1,430 pounds, Henri Page; a 40 horse power Darracq, Jules Sincholle, and a 35 horse power Darracq, George Papillon. The Panhard led for 7½ miles, when it was passed by the 40 horse power Darracq, then by the Decauville, and at last by the other Darracq. The machines finished in this order, Sincholle's machine winning in 10 minutes 52.45 seconds, followed by the Decauville in 11 minutes 6 seconds, and the 35 horse power Darracq in 11 minutes 33.45 seconds. The fastest mile was the second, made by the Panhard in 1 minute 32.5 seconds.

Sixth on the card was the first heat—for a best two out of three—of the much heralded Oldfield-La Roche match for a silver track championship trophy. The distance was 5 miles, and the machines made standing starts from opposite sides

of the track. By the rules, any accident to man or machine in the first mile was to be cause for a new start, and accordingly Oldfield had hardly left the post when he returned to readjust a vibrator screw.

The second start was perfect, and it was promptly seen that La Roche, although driving his machine to the utmost, had little chance against Oldfield. Around and around the latter spun, making his first mile in 1 minute

11 3.5 seconds, leaving La Roche as though anchored, while he made the second mile in 1 minute 4.5 seconds, making his third mile in 1 minute flat, his fourth in 58.35 seconds, and the fifth in 58.45 seconds, finishing in 5 minutes 9.45 seconds, with La Roche nearly a mile behind. This broke all world's records for standing starts in competition. La Roche made the 5 miles in 6 minutes 15.15 seconds.

The seventh race, a 15 mile flying start free for all—barring Oldfield and La Roche—for \$100 and \$50 silver trophies as first and second prizes, respectively, would have proved more interesting had not minor breakdowns handicapped three of the contestants. The entries were the 80 horse power Gordon Bennett Peerless; Jules Sincholle, with his 40 horse power Darracq; Geo. Papillon, with his 35 horse power Darracq; a 70 horse power Panhard, piloted by T. Troger, and Henri Page and his 40 horse power Decauville. The Panhard led at the beginning, but after running 2½ miles had to drop out on account of an inoperative valve spring. The Peerless had run less than a mile when a number of leaks appeared in its cooling system, apparently due to steam pressure developed by excessive heat. Until the fifth mile,



JOHN WILKINSON IN HIS FRANKLIN RACER.

Sincholle's Darracq led. Then the tread of one of his rear tires commenced to peel off in a dangerous manner, and, although he pluckily maintained a high speed, the Decauville and the other Darracq passed him—the Decauville winning in 16 minutes 39.45 seconds, with the 35 horse power Darracq second in 18 minutes 18.45 seconds. Sincholle finished in 19 minutes, flat.

The eighth event was the second heat of the Oldfield-La Roche match. This time both contestants made flying starts from the same side of the track. Oldfield took the lead as easily as before, thundering rapidly ahead of his competitor and taking the turns of the track in his peculiar fashion of swinging widely from the outer fence on the straightaway stretches to the rail at the turns—thus considerably lengthening his mile, but enabling him to maintain a higher speed through increasing the radius of his curves. He took 1 minute 23.5 seconds to do the first mile, then ran the others in 57.25 seconds, 58.35 seconds, 57.35 seconds, and 58.45 seconds, respectively, the time for the five miles coming to 4 minutes 55 seconds—a new competition record, but not lower than his record of 4 minutes 54 seconds against time, made at Columbus, Ohio, July 4.



BARNEY OLDFIELD IN HIS SEVENTY HORSE POWER FORD RACER.



THE TWELVE HORSE POWER LA ROCHE MACHINE.

Oldfield having won the first two heats, the third with La Roche was not run.

Ninth on the program was a series of individual trials against the mile record, from flying starts, to be rewarded by a silver trophy for the fastest mile and by medals for any new class records. The contestants and times were as follows: 80 horse power Peerless, 1 minute 9.3-5 seconds; 40 horse power Darracq, 1 minute 15.2-5 seconds; 10 horse power Franklin, 1 minute 20.4-5 seconds; 70 horse power Panhard, 1 minute 5.2-5 seconds; 60 horse power Mercedes, 1 minute 3.1-5 seconds; 40 horse power Decauville, 1 minute 7.1-5 seconds. Subsequently, on unofficial rounds, the Mercedes went a mile in 1 minute 2.1-5 seconds and the Decauville a mile in 1 minute 6 seconds. Eleven other machines were entered in this event, but

vehicle trials, which also were held during very hot weather, the thoroughly practical results that are to be obtained from air cooled motors have been strongly emphasized.

Doctor Jackson's Transcontinental Trip.

Dr. H. Nelson Jackson, of Burlington Vt., claims the honor of having been the first to complete a trip across the American continent in an automobile.

With his chauffeur, Sewall K. Crocker, Dr. Jackson left San Francisco May 23 and arrived in New York July 26, having been sixty-three days on the way—nineteen of which were spent in resting or in awaiting the arrival of new tires or parts.

In an interview with a representative of

failed to start, partly on account of the lateness of the hour.

An announced 5 mile race for 25 horse power Panhards was not run, only one of the three entries being on hand to start. A motor bicycle race that had been planned was also given up, only two entries having been received.

A lesson of the day that was not lost on the advocates of air cooling was the splendid performance of the Franklin in two successive races, and the excellent showing of the Orient buckboard. Taken in connection with the work of the Knox cars in the recent commercial

THE HORSELESS AGE, Dr. Jackson stated that with the exception of the ferries across San Francisco Bay and the Snake River, his machine—a 20 horse power Winton, without tonneau—traveled on its own wheels every foot of the way. The only times when it did not also run by its own power were a few occasions when horses or a block and tackle were used to draw it across streams or out of miry places. The total of the distances overcome by these methods was said not to have exceeded a quarter of a mile. To prove that the trip was thus completed in a fair manner, Dr. Jackson shows indisputable evidence in the form of press clippings, letters, etc., dated at the various towns en route.

Three cyclometers were carried at the start, but two were lost. The distances traveled therefore were largely estimated. As nearly as the doctor is able to figure he has covered 5,600 miles since leaving San Francisco and expects to run over 400 more in reaching his home in Burlington, Vt. This excess over the railroad and air line distances was due to the many detours that were necessitated. Post office inspectors' records were largely depended on for information concerning roads and distances.

The itinerary was substantially as follows: San Francisco (May 23), Oakland, Tracy, Stockton, Sacramento, Oroville, Chico, Tehama and Anderson, Cal.; La Revere, Prineville, Silver Springs and Ontario, Ore.; Pocatello (June 17), Idaho; Granger, Rawlins (June 23), and Cheyenne (July 2), Wyo.; Omaha, Neb.; Des Moines, Ia.; Chicago (July 17), Ill.; Ligonier, Ind.; Toledo and Cleveland, Ohio; Erie, Pa.; Buffalo, Rochester, Syracuse, Utica, Albany, Poughkeepsie and New York city (July 26), N. Y.

Many difficulties were encountered. Near Sacramento, Cal., a woman misdirected them 54 miles in order that her family might have the opportunity of seeing an automobile. At Silver Springs, Ore., the supply of gasoline ran out, and it was only after 3 miles on a bicycle and a 20 mile walk that Crocker was able to secure the delivery to the stalled machine of 3 gallons of benzine and 2 gallons of gasoline, at a total cost of nearly \$25.

At Medicine Bow Corners, Wyo., \$5.25 was paid for 5 gallons of gasoline. In Nebraska 60 cents a gallon was often paid for fuel, the dealers taking advantage of a local law restricting the sale of gasoline for other than stove purposes. At Granger, Wyo., a 60 mile detour was made necessary to avoid a narrow ravine.

While running at high altitudes it was found necessary to open up the air inlets of the carburetors. Many streams were forded by rushing into them at full speed, and depending on momentum to carry the car through. The deepest streams forded in this manner were nearly 3 feet, although it was occasionally necessary to use block and tackle to pull out. Streams of less



THE FOURTH RACE, SHOWING PEERLESS AND MERCEDES.

(than 2 feet in depth were forded with the engine running. At half a dozen points on the route, it was necessary to take to the railroad bridges, several miles of bumping over ties being often involved because of there being no nearer place of access to the track. Sandy roads sometimes forced the machine to crash through sage brush and across country, and it was in this manner that the cyclometers were lost. The "buffalo wallows" of Nebraska proved the most prolific source of trouble, and it was here that the block and tackle were of the greatest utility. This arrangement consisted of a pair of pulley blocks rigged with 150 feet of $\frac{3}{8}$ inch hemp rope. One block was attached to a 3 foot length of scantling which could be buried in the road ahead. Then, with the other hooked to the machine, the engine started, and two men pulling on the rope, little difficulty was experienced in climbing out of the worst places, although progress was necessarily slow. One day in Nebraska this operation had to be repeated seventeen times. The total mileage for the day was 16 miles. When all else failed and the wheels of the car were slipping, the plan of hitching the free end of the rope about an end of the rear axle, using it in the manner of a hoisting drum, was found to work infallibly.

The machine weighed 2,865 pounds with all its load but the passengers. Mr. Crocker weighs 150 pounds and Dr. Jackson 204. In addition to the regular to gallon gasoline tank, 12 gallons were carried in an extra tank in front. Five gallons of lubricating oil were also carried. The outfit was as follows: Two waterproof sleeping bags, each with two blankets inside and a waterproof head flap; rubber mackintoshes and lap robes; leather coats for cold weather; a telescope valise for clothing; corduroy and canvas suits; a rifle, a shotgun, two automatic pistols, and fishing poles; tools and extra parts; a vase; extra tires; an axe, and two canteens and a canvas bag for water.

Accidents were few, considering the arduous nature of the trip. An air intake lost from the rear carburetor caused one delay. A cap lost from one of the front wheel hubs caused another, resulting in lost and broken balls and a ground up cone. Other balls were secured from a mowing machine and a new cone made by Crocker in a mine machine shop. At Rawlins, Wyo., a stud bolt in the connecting rod broke, causing a hole to be knocked in the crank case. Soon after the same thing happened again. Both times new parts had to be waited for. Most serious of all was a broken front axle, which, however, was readily repaired for the time being by wedging it into a sleeve made of a section of water pipe. At last a blacksmith shop was reached and the axle welded.

The machine was second hand when it left San Francisco, having been run 500 miles. One rear tire had been replaced, and the other three tires were somewhat worn. Goodrich clinchers were used. It

was soon necessary to replace one rear tire, which was then punctured by a rock before it had run 200 miles. A wrapping of rope made it do service for a time. Two second hand tires were secured, but one was found to be so rim cut as to be useless; the other had also to be wrapped with rope to hold it together. Four new Goodrich tires were received at Ontario, Ore., and with those already on hand lasted to New York, although as a precaution an extra tire was purchased in Chicago. The front tires held all the way from the start to Troy, N. Y., and did not absolutely need to be changed then. In all four 4 inch Goodrich tires were used on the rear wheels from Ontario, Ore., to New York city.

New Incorporations.

The Queen City Automobile Exchange Company, of Buffalo, N. Y.—Capital, \$2,000. Incorporators, J. Homer Betts, Fred F. Beck and Frederick C. Rapp.

The Ormond Automobile Company, of Brooklyn, N. Y., has been incorporated by Hiram A. Lyons, Wilfred Burr and Robert W. Hoff. Capital, \$7,500.

The Perfect Kerosene Motor Company has been incorporated in East St. Louis, Ill., with a capital of \$30,000. The incorporators are Bernard H. Pomeroy, William E. Johnston and C. H. Huff.

The Ormond Automobile Company, of 189 Montague street, Brooklyn, N. Y.—Capital, \$7,500. Incorporators, Hiram A. Lyons, Wilfred Burr and Robert Hoff.

The Rapid Transit Auto Company, of Buffalo, N. Y.—Capital, \$10,000. Directors, Charles W. Roe, John M. Campbell and Arthur S. Hartsell.

In Holyoke, Mass., the Bassett Motor Vehicle Company has just been incorporated under the laws of the District of Columbia, with a capital of \$2,000,000. R. S. Couch is named as president; L. T. Bassett, treasurer; Hartley R. Walker, secretary, and B. C. Burington, director. A new patent is said to be the basis of the concern, and its first activities will be the sale of stock.

Accidents.

At Providence, R. I., on July 17, an automobile occupied by two men and two women overturned at 9 p. m. on Reservoir avenue, near Pontiac street, a district not well lighted. The car was wrecked and one of the women very seriously injured.

An automobile (foreign racing type) driven by Edwin E. Hawley, chauffeur, and occupied also by two women and two children, got beyond control on the Ocean Parkway, near Caton avenue, Brooklyn, N. Y., at midnight from July 21 to 22, and ran into the curb, throwing all the occupants out. One of the women was killed. Hawley admitted having driven at about thirty-five miles per hour just before the accident.



Fourth German Automobile Congress.

The German Automobile Association held its annual meeting, the so called German Automobile Day, in Munich from July 5 to 8. The association comprises sixteen German automobile clubs, with a total membership of about 1,300, while three other clubs, those of Colnitz, Brunswick and Stuttgart, and the Mid-European Motor Wagon Association, with a membership of 900, have applied for membership in the Automobile Association recently.

The automobilists arrived in Munich on July 4, and a preliminary meeting was held on the evening of that day. Besides delegates from all of the member clubs of the association, representatives had also been sent by the Austrian Automobile Club. An address of welcome was delivered by Herr Pohlmann, president of the Bavarian Automobile Club, which was followed by an address by the Duke of Ratibor, president of the German Automobile Club.

On Sunday afternoon, July 5, the delegates convened in the Rathaus Saal. After a number of perfunctory addresses General Becker presented the report of the association's activity during the past year. He mentioned as one of the subjects requiring the attention of the association the obstacles placed in the way of the automobile movement, such as toll charges in Prussia and several small states, and pavement toll in Southern Germany. The association, he said, had applied to the Imperial Chancellor for the adoption of uniform police regulations concerning automobile traffic for the whole empire. The association has also decided to publish a year book for the year 1903-1904 and has made favorable arrangements with the Stuttgart Insurance Association for the insurance of its members.

Another subject on the program was alterations in the rules for automobile races and endurance runs, but General Becker counseled the abandonment of this project for the present, as he thought it advisable for German automobilists to do everything in their power to have the race for the Gordon Bennett Cup run on German territory next year. It would, of course, be necessary to take very extensive precautionary measures. One of the delegates suggested that in addition to the present rules, which encouraged only the production of racing machines, a set of rules might be formulated with a view of advancing the construction of service vehicles. The meeting, however, supported the proposal of General Becker to postpone this question to a later date.

The administration of the association was then requested to make arrangements with foreign automobile associations con-

certing the placing of the simplest possible international warning signs at dangerous road turnings. Another paper dealt with the responsibility of automobile drivers in cases of accident.

A paper on the prevention of the dust nuisance was then read by Max Zechlin, engineer, Charlottenburg. The engineering of road construction, he said, remained practically at the same point today where it was 100 years ago. Highways with solid pavements, though they had increased in number, presented still the same objectionable features as formerly; namely, extreme dustiness during dry weather, dirt and slipperiness in wet weather, exceptionally high depreciation and consequent frequent need of repairs, and often unreasonable rounding. The present sprinkling methods must be considered very imperfect, because in the same degree as they overcome dustiness they make the road surface slippery. The author of the paper stated that a company had been formed recently under the title of "German Oil Sprinkling Works," which had for its object to render the public roads free of dust and which proposed to work on a large scale. It was proposed to use for this purpose a mixture of kerosene and water. According to a report by the municipal gas and water department of Frankfort, where 27,000 square metres were

sprinkled with the mixture, the trials proved successful from a technical standpoint. Oil sprinkling also proved very successful in Ireland during the recent Gordon Bennett race.

The meeting was then closed by an address by the Duke of Rathor.

At the conclusion of the meeting there was an automobile parade to Castle Nymphenburg, the residence of Prince Ludwig Ferdinand of Bavaria, in which about 120 automobiles, mostly tastefully decorated, took part. The automobilists were escorted by twenty motor cyclists. During the return many of the vehicles proceeded at a rather fast pace, as a strong downpour was threatening.

On Sunday evening the annual banquet of the association took place, which was participated in by about 200 automobilists, and on Monday afternoon there was an automobile excursion to Starnberg, a distance of about 15 miles. The congress came to a close on Monday evening.

The Jenatzy Magnetic Clutch.

An interesting feature of a new car, manufactured by the Martini Works in Liege, Belgium, is a magnetic clutch designed by M. Jenatzy.

The magnetic clutch is fitted in the same position as an ordinary friction clutch, the flywheel forming a part of it. The flywheel A is bolted to a flange on the end of the crank shaft B. The rim is grooved at D to contain a coil of insulated wire, which is wound in the shape of a large ring, and fits in the groove. The flywheel is made of steel. A steel ring C is fixed in the position shown after the coil is in place. This ring has slots cut through it at intervals, and they are filled with blocks of anti-friction metal E.

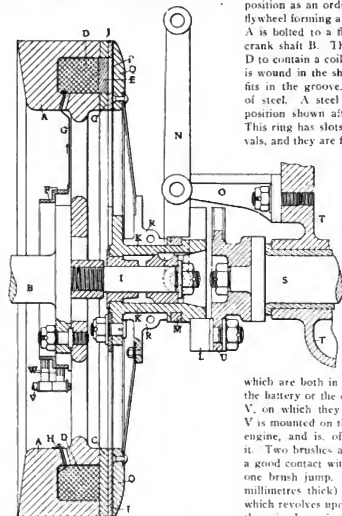
One end of the coil D is connected by a wire G with contact rings F, which are insulated from the flywheel, and revolve with it. The other end of the coil D is grounded at H. The electric current which energizes the clutch by magnetizing its flywheel member is led to the coil through the two brushes W.

which are both in electric connection with the battery or the dynamo through the pin V, on which they are lacerated; the pin V is mounted on the crank chamber of the engine, and is, of course, insulated from it. Two brushes are fitted so as to insure a good contact with the rings, even should one brush jump. A thin iron disk J (3 millimetres thick) is fixed to a sleeve K, which revolves upon a bearing provided by the pin I projecting from the flywheel. The sleeve K is free to move, a certain dis-

tance longitudinally, and, therefore, the disk J can be brought into contact with the flywheel ring C or can be moved away from it. Slots P are formed at intervals in the disk Q. The sleeve K terminates in a flexible coupling member L, by which it is connected with the driving shaft S of the gear box T, through the other coupling member U. A steel ring Q lies outside and alongside the ring J. It is carried by a split sleeve R, which revolves freely outside the sleeve K. This ring Q forms the armature of the clutch, and is caused to grip the disk J between it and the pole piece ring C when they are magnetized by the passage of the current through the coil D.

It should be clearly pointed out that the ring Q is mounted freely, and is not rigid either with the driving or the driven portions of the clutch. Although the clutch members are drawn together magnetically, and the force exerted can be varied in the manner which will be described presently, yet the same foot pedal, which controls the clutch electrically, is also connected mechanically with the sliding sleeve K, so that the disk J and the ring Q shall be moved out of contact with the flywheel ring C when the foot pedal is fully depressed. This mechanical connection is very similar to that employed for operating an ordinary friction clutch, the foot pedal being connected with the lever N, which is pivoted to the bracket O, and engages at its lower end, through the ring M, with a groove in the sleeve K. As the foot pedal is depressed the degree of magnetism holding the clutch members together is gradually reduced, and finally the sleeve K is moved rearwardly to separate the clutch members.

The current on its way to the brushes W, and thence through the clutch coil D to the "ground," is led through a variable resistance device, which is mounted in front of the dash, beneath the bonnet. This apparatus consists of a rotary six pronged switch drum, the stationary contact pieces for which are connected with fine wire resistances contained in the base of the apparatus. The switch drum is connected with the clutch pedal N by means of a rod, so that as the pedal is pressed down the switch drum rotates about its axis, gradually cutting in more and more resistance into the circuit, by drawing the contact arms away from their stationary contacts. There are six arms and six contacts, so that the amount of current passing through the clutch coil is reduced in six stages. The lines of force in the magnetic circuit pass through the armature ring Q, and the force exerted in holding the disk J and the armature Q solid with the flywheel is enormous, although a current of only half an ampere, at an E. M. F. of 16 volts, is required as a maximum. The number and sizes of the slots P in the disk J are important, and have been so proportioned that while on the one hand a sufficiently powerful grip is assured, yet, on the other



JENATZY MAGNETIC CLUTCH.

hand, the disk J is easily released when the foot pedal is fully depressed.

The advantages claimed for this magnetic clutch are (1) that any desired degree of slip can be permitted; (2) that the car can be started gradually, and without shock; (3) that very little pressure need be exerted on the operating foot pedal, and (4) that the momentum of those revolving parts, which are connected direct with the gear shaft S is unusually small, owing to the fact that the only clutch member which is rigid with it is the disk J. This last mentioned characteristic renders the manipulation of the change speed gear exceptionally easy, and tends to increase the life of the change speed gear considerably.

The electrical apparatus consists of a battery of eight cells, the capacity of which is thirty ampere hours, and of a special dynamo, which can be used for recharging the cells, or for supplying the necessary current direct. The battery is contained in a box fixed on the right hand side of the car in front of the driver. The dynamo is driven by a belt from the shaft of the water pump. The pulley on the dynamo spindle is connected to it through a friction clutch, which is normally held in engagement by a spring. Outside the pulley there is a centrifugal governor, which acts upon the friction clutch and allows it to slip when the speed of the dynamo reaches a certain point. The dynamo, therefore, runs at an approximately constant speed irrespective of that of the engine. It is wound to give twenty-four volts, and supplies sufficient current for operating the magnetic clutch and the igniters, as well as for lighting the carriage lamps. The clutch takes half an ampere, and we have already said; the igniters take about one and a half amperes each, and the carriage lamps, together, consume four amperes. A small switch is fitted behind the dash for (1) enabling the batteries to be brought into operation alone; (2) for connecting the dynamo so as to work in parallel with the cells, and so charge them; or (3) for connecting the dynamo so as to feed the electrical appliances alone. Except for this switch and a switch for the lamps, the dashboard in front of the driver is free of all fittings. The special switch resembles an ordinary bolt, such as is used for bolting a door. Its slotted socket, in which the bolt itself slides, is divided into three separate parts which are insulated from one another. The central portion is connected with the insulated terminals of the various apparatus, and the two other parts are connected with the insulated terminals of the battery and of the dynamo, respectively.

—From the *Automotor Journal*.

In a report on the automobile industry in Germany it is stated that that country has at present six manufacturers of electric vehicles, two of steam and thirty-four of gasoline cars. The total production for 1903 is estimated at 3,000 cars and 1,000 motor cycles.

A real estate company has been formed among members of the Automobile Club of France, which has acquired the property at 8 Place de la Concorde, adjoining the club's present quarters. The new building will be used by the club's social division.

At the recent meeting of the French "Chambre Syndicale de l'Automobile" new officers were elected as follows: Marquis de Dion, president; MM. Jeantaud and Richard, vice presidents; Emile Mors, secretary; L. Lemoine, treasurer, and A. Peugeot, keeper of records.

M. René de Knyff has now been for some years a chevalier of the Legion of Honor. It does not seem altogether consistent to make a "horseman" out of an automobilist, and if the Legion of Honor wants to be thoroughly up to date it should create another degree—Chaufeur de la Legion.

At a special meeting on July 4 the international committee disqualified Mr. Edge for the fifth place, which they had awarded him in the Gordon Bennett race. They found it proved that in his case the rules had been violated by the fact that his car had received assistance by pushing in the Athly control.

William Browne Clayton writes to the *Irish Times* about Stocks' accident in the Gordon Bennett race: "Chevalier Rene de Knyff did come up the wrong road, and through the wire guard, but it was replaced, and never was 'left projecting across the road.' That is, the course, for other cars passed after Chevalier de Knyff without accident. Whether Mr. Stocks mistook the course, or whether he found, at the pace he was going, that he would not 'take' the very sharp turn, he alone can tell, but the wire was not on the road, and, therefore, could not have caused the accident. I was only about 10 yards from where the car was turned over."

NEW VEHICLES AND PARTS.

The "Automotor" 18 Horse Power Touring Car.

The Automotor Company, of Springfield, Mass., have completed a new four cylinder touring car, weighing approximately 1,700 pounds.

The wheel base is a little over 7 feet and the tread is standard. The road wheels are all shod with 30x3½ inch Diamond detachable tires. The front wheels run on ball bearings. Full elliptic springs are fitted in front and the rear part of the machine rests on platform springs. The frame is built up out of steel channels, which at the purchaser's option are filled with wood. The motor and change speed gear case are mounted on a false frame.

The engine is rated at 18 horse power and may be run as fast as 1,800 revolutions per minute. The bore is 3¾ inches and the stroke 4½ inches. The cylinders are of the individual type, with integral heads. The crank case of aluminoid is dustproof.

The cooling water is circulated by means of a chain driven pump. From the cylinder jackets the water flows to the cooler and then to the tank, from which it is drawn by the pump and discharged into the water jackets. The cooler, of the fluted tube pattern, has been a feature of the "Automotor" for some time. The makers term it "the Diamond cooler," and claim that the sheets of water in the tube have a thickness of but one-sixteenth of an inch. A belt driven fan is provided to increase the draft between the tubes. The water system holds about 5 gallons, including the tank, which is located under the frame at the extreme rear. One supply of gasoline, it is said, is ample for a run of 200 miles.

Ignition is by jump spark and dry cells, of which latter there are two sets. One carburetor of the float feed type is employed. The branch tubes leading from the main mixture tube are secured to the "bells" that cover the admission valves by means of unions. To remove an inlet



EIGHTEEN HORSE POWER AUTOMOTOR TONNEAU.

valve it is only necessary to back off the union and loosen the cap screw which holds down the bell. The contact breaking device is equally accessible, being mounted on the dashboard and enclosed in a case with a glass plate.

The variable speed gear is of the planetary type and gives three forward speeds and a reverse. On the high speed the drive is direct to the bevel pinion, which meshes with the large bevel gear of the rear axle. All the clutch bands that lock the drums of the speed gear are applied by means of pedals, three in number, viz.: One for the high speed, a second for the reverse and a third for the low or intermediate speed, according to the position of the hand lever, which is placed next to the emergency brake lever on the right side of the car. The high speed pedal is provided with a catch, so that it is not necessary to keep the pedal under the pressure of the foot when driving on the highest gear. The other control devices are a steering wheel, a brake pedal, an emergency brake hand lever and thumb levers to time the spark, adjust the supply of air to the carburetor, and to accelerate the speed of the engine by cutting out the governor action.

Each cylinder of the engine is provided with a Splittorf coil. To enable the operator to readily adjust the set screws of the buzzers the coils are built into a box which is secured to the dasher. The most important bearings are lubricated by a "Multiplex" automatic oiler. The oil reservoir is connected up with the exhaust pipe, so that oil flows only when under pressure—i. e., when the motor is running—so that no turning on or off of the oil feed is required. The foot brake acts on the uni-

versally jointed shaft. Double acting hub brakes are also provided, as shown in the illustration.

The aluminum body has an angle iron frame and divided seats in front. The lazy backs, which are of the "King of Belgium" style, are of ample height to afford protection against dust.

Willis' Water Separating Funnel.

The accompanying cut shows a funnel designed for use in filling gasoline tanks and claimed to eliminate any water that may be contained in the gasoline. The funnel is made in two parts, one telescoping into the other, a straining part being held between the two parts, as clearly shown by the cut. The funnel is marketed by E. J. Willis, Park place, New York.

The Howard Light Delivery Wagon.

The accompanying half tone illustrates a new delivery wagon of the Howard Automobile Company, Yonkers, N. Y. The vehicle, which is built for a net load of 1,000 pounds, was designed by W. S. Howard, who was formerly connected with the Grant-Ferris Company, of Troy, N. Y.

The wheel base is 7 feet and the gauge is standard. All the road wheels are of the same size, and are shod with 30x3½ inches elineher pneumatic tires. The wheels, of the artillery pattern, have twelve spokes each. The front wheels run on ball bearings, and the shafts, to which the drivers are keyed, rotate in Timken roller bearings. Unusually long body springs are employed to give the vehicle good riding qualities. The springs are all of the semi-elliptic type, 38 inches long from eye to eye, and have five plates or leaves. The



THE WILLIS FUNNEL.

frame is built up of channel steel bars, and no false frame is used, the machinery being hung from the main frame.

The motor has two vertical cylinders, with a bore of 4½ inches and a stroke of 5 inches. It is rated at 12 horse power, and may be controlled within the range of 200 to 1,200 revolutions per minute, the normal rate of speed being 600 revolutions.

Lubrication is by splash, ignition by the contact spark system, and circulation of the cooling medium is obtained by means of a pump. Electric current is generated by two sets of dry cells and a Remy magneto. The pump is driven off the flywheel by frictional contact between the rim of the wheel and that of the pump pulley. The radiating coil has five vertical and three horizontal rows of flanged tubes which fit into headers at either end. The water tank is built into the dasher. Twelve gallons of water will fill the entire water circulating system. The gasoline tank holds enough oil for a run of 40 miles. Should the purchaser desire to have a larger fuel receptacle the car will be equipped with one.

The variable speed transmission gear affords a reverse and three forward speeds, and direct drive on the highest gear. The bevel gears give a reduction of 4÷1.

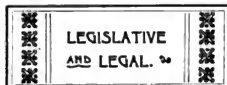
The rear axle is trussed, and the driving wheels and their shafts are secured in such a way that a wheel and its shaft may be withdrawn by simply loosening a collar after the axle has been jacked up. The vehicle is provided with a transmission and an emergency brake. The latter acts on the hubs of the rear wheels.

There is no machinery in the body, which has a loading area of 5 feet in length and 32 inches in width. The roof is about 5½ feet above the floor. Light parcels may be carried inside of the railing on the top of the machine, and access to the engine and transmission gear may be had by opening or raising the bonnet and by removing the footboard, respectively.

A new device for preventing tire punctures, and also at the same time reducing the chance of skidding and side slipping, has recently been put on the market by Messrs. John Wheelon & Co., of the Alma Rubber Works, Sheffield, England. The guard, as it is called, is made of strong flexible fabric or cloth, in the shape of a thin band between which small sections of flat steel are placed, and firmly held in position by a strong elastic cement.



HOWARD LIGHT DELIVERY WAGON.



Minnesota State Law on Automobiles.

CHAPTER 356—H. F. NO. 671.

Be it enacted by the Legislature of the State of Minnesota:

Sec. 1. No person, driver or operator in charge of any automobile, motor vehicle or motor cycle on any public road, highway or street within the State shall drive, operate, move, or permit the same to be driven, operated or moved at a rate of speed faster than 8 miles per hour within the thickly settled or business portion of any city or village within this State, nor outside of such thickly settled or business portion of any city or village on any public road, highway or street, at a rate of speed faster than 25 miles per hour, nor over any crossing or crosswalk within the limits of any city or village, at a rate faster than 4 miles per hour when any person is upon the same.

Sec. 2. The driver or operator in charge of any automobile, motor vehicle or motor cycle on any public road, highway or street within this State when signaled by the driver of any vehicle propelled by horses, shall stop said automobile, motor vehicle, or motor cycle, until the other vehicle has passed.

Sec. 3. Every automobile, motor vehicle or motor cycle, when driven on any public road, highway or street within this State shall, during the hours of darkness, have fixed upon some conspicuous part thereof, at least one lighted lamp suitable for the use of said automobile, motor vehicle or motor cycle, respectively.

Sec. 4. Every automobile, motor vehicle or motor cycle using gasoline as motive power shall use the "muffler," so called, and the same shall not be cut out or disconnected within the limits of any city or village within this State. Every automobile, motor vehicle or motor cycle shall be provided with a bell or horn, which shall be rung or blown whenever there is danger of collision or accident. The driver or operator of every automobile, motor vehicle or motor cycle shall be governed by the usual law of the road by turning to the right in meeting vehicles, teams and persons moving or headed in an opposite direction, and by turning to the left in passing vehicles, teams and persons moving or headed in the same direction.

Sec. 5. Before any automobile, motor vehicle or motor cycle shall be driven or operated upon any public road, highway or street within this State the owner thereof shall take out a license for said automobile, motor vehicle or motor cycle, which said license shall be issued by any State boiler inspector in the county where

such automobile, motor vehicle or motor cycle is owned. Any person obtaining such license shall pay for the same the sum of \$2 to said boiler inspector, who shall issue such license and shall record each license issued by number in consecutive order. The number of each license shall be painted in plain figures upon the back part of each machine in a conspicuous place, and said figures shall not be less than 4½ inches high and of proportionate width.

Provided, however, that nothing in this section contained shall be construed to refer to any driver or operator of any automobile, motor vehicle or motor cycle licensed by any municipality in this State, nor to any automobile, motor vehicle or motor cycle, the numbering of which is provided for by any such municipality.

Sec. 6. Any boiler inspector issuing a license shall keep a correct record of all licenses issued in a book to be kept for that purpose.

He shall make a correct report to the county treasurer of the county in which he resides at the end of each month of all licenses issued during the month, if any, together with one-half of all fees collected, and shall turn over to such county treasurer one-half of all such fees; the other one-half of the fees so collected he shall be allowed to retain for his services for issuing such licenses.

Sec. 7. Any person violating any of the provision of this act is guilty of a misdemeanor.

Sec. 8. This act shall take effect and be in force from and after its passage.

Approved April 21, 1903.

Law Regulating Sale of Gasoline, Etc

CHAPTER 42—H. F. NO. 243.

Be it enacted by the Legislature of the State of Minnesota:

Section 1. Any manufacturer, vendor or dealer who shall sell, cause to be sold, fill or cause to be filled for the purpose of sale or other use, any can or other container with gasoline or benzine, in quantities of more than one pint and less than 6 gallons, without such can or other container being of bright red color and plainly tagged, labeled or branded in large plain letters, with the name of the contents, or any manufacturer, vendor, or dealer who shall sell or cause to be sold, fill or cause to be filled for the purpose of sale or other use with kerosene or other illuminating oils, in quantities of more than one pint and less than 6 gallons, any can or other container, when said can or other container is not of a red color, shall be deemed guilty of a misdemeanor, and, upon conviction, shall be subject to fine of not more than \$100.

Sec. 2. This act shall take effect and be in force from and after July 1, 1903.

Approved March 7, 1903.

Half a dozen arrests have recently been made by the police of Chicago in an ef-

fort to enforce the law requiring the numbering of machines.

Colorado Springs, Col., has under consideration an 8 mile auto ordinance.

The fire department of Milwaukee, Wis., is after automobilists who are not complying with the local ordinances relative to the storage of gasoline.

The commissioners of Lincoln Park, Chicago, are reported to have arranged a heavy cable at the park entrances, to be used in capturing law breaking automobilists.

In Buffalo, N. Y., strict enforcement of the Bailey law has been undertaken. The superintendent of police has issued an order prescribing the districts in which the different speed limits shall apply.

The automobile ordinance recently passed in Toledo, Ohio, is said to be inoperative because of a failure to provide means by which the city auditor can furnish tags, as is required, to applicants.

Charles Bartels, chauffeur to August Belmont, was arrested July 24 at Glen Cove, N. Y., for alleged violation of the speed laws. Upon showing that the sign posts required by the Bailey law were not in place, he was released.

W. F. Burghardt, of Springfield, Mass., was fined \$50 July 13 for running his automobile at an excessive speed. This action was a result of the accident in which a Mrs. Baker was injured. It is understood that Burghardt will appeal the case.

Automobile owners of Milwaukee, Wis., have prepared an ordinance providing for a 15 mile maximum speed and the exclusive use of horns for signaling. An effort will be made to have this passed by the Common Council in place of the one now pending.

The Massachusetts highway commission is having a good deal of trouble in registering and licensing the automobilists of that State. It is said that the new law is found to abound in inconsistencies and absurdities. Less than 400 applications have been received.

Mrs. Laura E. Scott, of Boone County, Ind., is suing James Peterson, of Darlington, Ind., for \$5,000 damages on account of injuries received in a runaway said to have been caused by defendant's automobile. The arresting officer knocked Peterson out of his machine with a club.

Acting Police Commissioner Elbstein, of New York city, issued an order July 21 that dealers may avoid arrest by attaching business signs of some sort to their demonstrating machines. He has also ordered that no arrests be made of new purchasers who can show a bill of sale not over ten days old in place of a number.

An anti-motorist suggests that cars should be compelled to carry day sheets indicating on a continuous line the speeds made by the car during the day. All such sheets to be produced on police demand, and each clean proof to be dated by a policeman in the locality where the start is made.



FENELON, NEV.



STEEP DOWN GRADE AT COLTON, UTAH.

Through Nevada.

The Packard Motor Car Company furnish the following details concerning the progress of their overland expedition:

The overland car arrived at Reno, Nev., at 9:35 o'clock Thursday morning, June 25, having made the run from Carson City in about two and a half hours, without difficulty of any kind or any incidents to be noted. The same afternoon an equally uneventful trip took the travelers to Wadsworth, 35 miles distant, where the difficulties were supposed to commence. The departure from this town was delayed a whole day by failure to receive gasoline freight bills, photographic films and other mail and express matter in time. When the start was finally made, on Saturday morning, many of the town people had gathered at the top of a steep sand hill, one of them provided with a team, rope and tackle that he expected would be called into requisition for drawing the automobile over the difficult spot, but provisions had been made by which this kind forethought on the part of outsiders had been rendered unnecessary.

The car carried two strips of canvas each 20 feet long and about 6 feet wide, with the idea in view that, if traction failed in deep and dry sand the canvas could be spread over the ground and the car be driven over without sinking into it too

deeply. This plan was carried out and it was with boundless surprise that the Wadsworth people saw the car rise slowly, but surely, over the steep grade and finally pass by them. They cheered vociferously, and even the man with the team took his disappointment in good part. For more than 10 miles thereafter the road lay through deep sand, and twice more recourse to the canvas was had in order to pull through. A little canvas awning had been built out over the front end of the car to shield the cooling coils from the direct rays of the sun, but even with this precaution it proved necessary to go even more slowly than the sand compelled, so as to avoid overheating.

About three hours and a half elapsed before the car had traversed the first 12 miles out of Wadsworth, and an idea may be formed of what this kind of sand means to the motor tourist when it is noted that on a 14 per cent. down grade it was necessary to drive on the low gear in order to reach the bottom. These trials over, the rest of the way to Lovelocks was found to afford comparatively easy driving. Late in the afternoon the first tire accident took place, due to a nail in a board lying in the road. Twenty minutes was required to pull out the injured section of the inner tube, put a patch in it and get it back into place.

Finally, Lovelocks was reached at 7:12

o'clock, the cyclometer registering 507 miles, and it was found by stick measure that the motor during the day, in spite of its hard work, had consumed only 6 gallons of gasoline. Before reaching Lovelocks the car had passed over a corner of the Humboldt River Sink, where this important watercourse disappears in the ground after serving to irrigate and fertilize innumerable ranches and farms in the valley extending for several hundred miles north and east. The course of the car lay henceforth for several days along the Humboldt River, with an occasional crossing of the mountain ranges which shoot into it at irregular intervals. In this valley Lovelocks is the first important town.

A third man had meanwhile been added to the party in the car, N. O. Allyn, who joined Messrs. Fetch and Krarup at Reno. It had been considered desirable that Mr. Allyn, who is an expert machinist, should travel by rail following the car within call by wire, so as not to be entirely dependent on local skill in case the car should be ditched or otherwise injured on those narrow roads where accidents might readily take place. So far, however, his services had never been required, and the inactivity being irksome, he asked the privilege of going with the car to see the scenery. He continued with the party from the Reno to Colorado Springs, seated



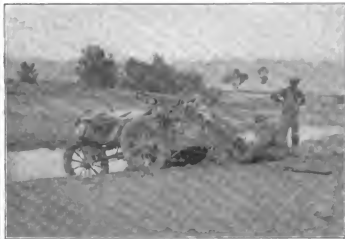
DUN'S GLEN, NEV.



SAND HILLS OF SOUTHEASTERN UTAH.



CASTLE VALLEY, UTAH—37 PER CENT. GRADE.



NEAR THOMPSON, UTAH, THE DRIVERS SPUN IN THE SAND.

on the baggage when the car was in motion.

The following day, Sunday morning, the start was made at 6:12 o'clock. It was only a short ride until the desert proper was again reached, where sand and sage brush and alkali reign supreme. Close to the river, where no irrigation has yet been organized, the surface was deeply furrowed by ravines—here commonly called arroyos—with perpendicular walls, and to cross these frequently involved a sinuous course, part of which lay in the bottom of the ravine, until a place could be found where the ascent of the opposite brink could be made.

That the road, on the whole, however, was not a difficult one is shown by the time made for the car arrived at Rye Patch at 8:33, having then made over 25 miles. Here a supply of gasoline, forwarded for the purpose, was found on hand at the station, and 8 gallons was taken on board, the two remaining gallons of the supply being donated to the town. The vicinity of Rye Patch abounds in short hills with grades up to 23 per cent, most of them being the ups and downs of those ravines before mentioned. At 10:40 o'clock Humboldt House was reached. Here on one side the snowclad mountain range looms up and the stony ground hardly leaves room for even the sage brush to take root,

while on the other side a few acres surrounding the Humboldt House show a luxurious vegetation and the green foliage of large trees, all the result of a little bit of irrigation. At this place a crowd of Indians, squaws and papooses, viewed the expedition curiously, waiting probably to be offered money for the privilege of photographing them. Occasionally one of these Indians consents to act as a guide over the mountain roads, but as a rule they pass their time either loitering in the shade or riding on top of freight trains, which by consent of the railroad companies they are permitted to do free of charge. Mills City, so called from an old mill located there, was reached at 11:42 o'clock; cyclometer, 555½. The thermometer at that time was 90° in the shade, the barometer 25.55 inches, indicating an altitude of about 4,400 feet.

It was decided to pass over the mountain visible from the town rather than to follow the river bottom land, where the sand was understood to be so abundantly deep, and the results justified the decision. The mountain pass route through Dun Glenn, a mining community, where a few old men still dig away for treasure, while the more enterprising young men have left for better fields, had many steep grades, but afforded a good road surface most of the way and interesting scenery.

The rise in elevation at the summit, compared to Mills City, was found to be about 1,500 feet. Then began the descent at 4:25 p. m., and this part of the trip was weird and picturesque. Until 5 o'clock the roads continued steep and winding, with many abrupt turns and curves.

At the bottom of this wild declivity, extending for probably 8 miles, the land spread in a conical formation of gentle grade to the west, north and east, and, descending this grade the overland car finally reached the sand bottom at 5:20 o'clock, still several miles from Winnemucca. Some hard pulling through this sand now took place, but the delightful discovery was soon made that where the sand was deepest and most impassable the enterprising citizens of Winnemucca had sent out their squad of road improvers, who had cut down the sage brush on both sides of the track and spread it over the sand, turning it into what is locally called a "brushed road." The effect of this improvement was far superior to corduroying, as the soft sage brush wood soon splinters into shreds and makes a soft and pliable roadbed. For nearly 4 miles the roads had been so treated, and for this reason the last stretch of the day's trip, which under other circumstances would have required a couple of hours of hard pulling, was finished at 6:30 p. m., the cyclometer showing 585 and the ba-



UTAH LANDSCAPE, ALONG THE EDGE OF THE UINTA INDIAN RESERVATION.



MET BY A DELEGATION FROM DENVER.

rometer telling the story that the level of Winnemucca and that of Mills City were exactly the same.

The next morning, Monday, June 29, rain poured down, and, as it was understood that the roads to Golconda lay largely through alkali deposits and marly bottom lands, departure was deferred until afternoon, so as not to court slippery mud before it proved absolutely necessary.

The machine was thoroughly inspected and oiled, and it was discovered that the spark plug for the first time required cleaning and also that the chain had stretched somewhat—by wear in the links, of course—and needed tightening. After dinner the distance to Golconda was made in an hour and twenty minutes, arriving there at 2:40 o'clock; but though it had ceased raining, the car was by this time in a bespattered condition that set the Golconda population to wondering what kind of traveling this was. Like Winnemucca, Golconda had never seen an automobile before. Continuing after a short stop for directions, the car was steered over the nearest mountain range toward Battle Mountain, and reached the summit an hour after, with the cooling water nearly boiling, the day was sultry and calm, and the climb of 4½ miles was sufficiently steep to make a total rise of 700 feet. The descent on the other side was an unmixed delight. For 6 miles fine coasting was enjoyed, over roads to all intents and purposes equal to gravel walks. Then came the bottom flat, covering some 5 miles, where the alkali shone like white enamel, out of which little bushes of sage protruded at intervals of from 20 to 30 feet. Then followed a plain level wagon rut trail, here and there obstructed by loose stones, but with nothing to hinder the timely arrival at Battle Mountain at 6:17 o'clock, the cyclometer showing the distance traveled just 60 miles during the half day.

N. A. A. T.

The technical committee of the National Association of Automobile Manufacturers will meet on August 4 to plan some experiments with tire valves. It is understood that a theory of Charles E. Duryea, concerning the usual resistance of these valves to the initial stroke of a pump, is to be tested.

A meeting of the executive committee will be held on August 5, at which general business and matters connected with the fall reliability run will be taken up. Harry Unwin, the association's secretary, reached Cleveland July 27, ending a trip from New York in which only two full days of fair weather were experienced.

The automobile races at Deauville, France, have been abandoned. The "terrasse" is too short for the power and speed now attained, and an attempt to get permission to race on the road between Deauville and Villers failed.



Automobile owners of Milwaukee, Wis., are planning the suppression of reckless chauffeurs.

An automobile storage and repair station is soon to be established in Youngstown, Ohio.

Business men at New Richmond, Ind., are talking of establishing an automobile factory there.

The Kentucky Automobile Company has opened automobile salesrooms in Louisville, Ky.

The question of using automobiles for collecting the mail has lately been revived in Chicago.

L. J. Sackett, lately with the Locomobile Company of America, has gone with the Searchmont Company as salesman.

A. H. L. Messmer, of Indianapolis, Ind., has invented a basketlike refrigerator, to be carried in automobiles and carriages.

A trolley company of Bangor, Me., is planning to use electric omnibuses to transfer across a bridge where its tracks are not permitted.

Charles E. Miller, the New York automobile supply dealer, will open a branch store at 127 West Thirty-sixth street, New York city, about August 1.

Charles A. Wardle, recently with the Locomobile Company of America, has gone with the Ford Motor Company, of Detroit, Mich., as sales agent.

William A. Brown, of Elwood, N. J., has applied to the Department of State for an automobile license for his traction engine, making his affidavit in regular form.

Appraiser Whitehead, of the Port of New York, has been sustained by his department in the valuation of \$12,465 placed upon a recently imported 60 horse power Mercedes.

John Godfrey, who recently appropriated an automobile from the barn of George D. Widener, in Philadelphia, has been released, his victims having agreed not to prosecute.

The Continental Caoutchouc Company inform us that the Mercedes cars which won in several events on the Empire City race track last Saturday were fitted with Continental tires.

Thomas H. Besse and his sister-in-law, Mrs. Salles, of New Orleans, La., who were injured by an overturning runabout at Providence, R. I., are both said to be in a very serious condition.

A warrant is said to be out for the arrest of Frank M. Baker, secretary of the Foster Automobile Company, of Rochester, N. Y. Detectives with warrants are seeking Park Densmore, president and treasurer of the concern.

The Pope Motor Car Company have completed at their Hartford factory the first model of their single cylinder gaso-

line runabouts, with planetary transmission and chain drive, which they intend to place on the market next season.

The Dill automobile party, which recently left Orange, N. J., for the Maine woods, has reached Boston in good order.

Major J. Fulmer, of Los Angeles, Cal., is reported to have successfully completed an automobile trip to the Yosemite Valley. He proposes now to proceed to San Francisco.

The Packard transcontinental tourists arrived at Julesburg, Col., July 27. The day before they drove 50 miles before breakfast. Sixty miles were covered on the morning of the 27th.

Harry L. Radford, who was at one time connected with the Winton Motor Carriage Company, has taken charge of the Eastern agency of the Upton Gear Company, of New York. The office of this branch is at 43 Columbus avenue, Boston, Mass.

The Bedford Automobile Company has leased the premises at 1000 Bedford avenue, Brooklyn, N. Y., and will continue same as an automobile storage and repair station. Agencies for the Oldsmobile, Franklin, Prescott and Baker machines have been secured.

James Lennox and James Schackleton, of Highland Creek, Ont., were under trial July 20 for wrecking an automobile belonging to C. A. Massey by placing a log in the road before it. The machine was damaged \$400 worth, and the three occupants thrown out and injured.

The factory of the New Rochelle Motor Works, New Rochelle, N. Y., burned down during the night from July 28 to 29. Fourteen automobiles, some launches and a new three story building were destroyed by the flames. The loss is estimated at \$30,000; the insurance on the property was \$15,000.

Messrs. Robinson and Fleming, formerly superintendent and shop foreman, respectively, of the New York storage station of the Mobile Company of America, have opened a storage station and repair shop in West Fifty-fourth street, New York city. Agency arrangements with several manufacturers will be effected.

The Locomobile Company of America announce the following as recent purchasers of their cars: Raymond Albright, Buffalo, N. Y.; J. H. Weaver, Philadelphia, Pa.; L. C. Lyon and D. N. Armstrong, Bridgeport, Conn.; Harry Dutton, Boston, Mass.; W. C. Koller, Washington, D. C., and D. N. Seeley, Pittsburgh, Pa.

The Peerless Motor Car Company, Cleveland, Ohio, wish us to contradict a rumor that the contemplated dissolution of the Peerless Manufacturing Company affected them. The Peerless Manufacturing Company, they state, transferred its interests to the Peerless Motor Car Company in November, 1902, and the latter company has been conducting the business ever since.



AN ENGLISH MILITARY CAMP, SHOWING SOME OF THE MOTOR WAGONS USED IN THE BRITISH ARMY.

Automobiles for Army Service.

The conditions of use of motor vehicles for military purposes is the subject of a recent paper read before the Italian Electrical Association by Captain Douhet. The author states that nowadays, as soon as an important invention is made, the question is at once raised: How can it be applied to the purposes of warfare? It is only natural that military engineers have been greatly interested in automobiles in recent years, because rapid transportation is one of the chief problems they have to deal with. Speed of movement, handling of supplies and command of artillery may all possibly be improved by the introduction of motor vehicles.

The motor propelled vehicles now available by no means satisfy the requirements of military work, but only by reviewing the present state of the art can the improvements of the immediate future be foreshadowed.

The author analyzes in detail the movements of an army and the possibilities of using automobiles. In the mobilization following the declaration of war the railways naturally play the principal part, and for this the automobile offers no advantages. When the troops are mobilized the army is put in movement as a whole. For the large units motor vehicles are evidently unsuited, but it is quite possible that certain small units might well follow the cavalry by the use of automobiles.

Vehicles for this purpose would keep to the main highways, and would resemble in general features the motor omnibus, being really intended to be an accelerated substitute for marching.

So far as the field artillery is concerned it does not appear feasible to use mechanical propulsion. For the transmission of intelligence and of orders the field telegraph naturally holds the first place. The bicycle is also very useful, but it is probable that a gasoline vehicle would be still more valuable for this service where the roads were not choked.

On the battlefield the motor wagon is thought to be impractical, except for transporting supplies from the surrounding country or from bases to the army. For an army composed of three army corps and one division of cavalry, a total of 100,000 men, 200 tons of supplies must be handled daily, which now requires 5,000 wagons and 15,000 horses. For this work motor wagons might well find application if they can be made to fill the requirements.

The roads on which the supplies must be hauled are frequently not in good condition, and sometimes transportation must be effected even across country. The vehicles must consequently be of great stability and very powerful and strong.

The weight of the vehicles with horse traction is limited to about 5 tons. A larger load capacity would be an advantage, but limitations are imposed by the

roadway. Ten to twelve tons will probably be found to be the best capacity. The ordinary speed of a convoy at present is about $2\frac{1}{2}$ miles per hour, but with motor wagons the speed might be increased to 5 to $7\frac{1}{2}$ miles per hour. The distance covered per day is fixed by the limitations of the horses and seldom exceeds 25 miles. With motor wagons human endurance is the chief limiting factor.

Captain Douhet then points out the weaknesses of the various motive powers for this kind of work, and suggests a new system original with him. The individual vehicles of a train are to be driven by electric motors, and these supplied with current generated by a gasoline engine charging set carried on a special vehicle.

Trade Literature Received.

R. E. Dietz & Co., 60 Lighthouse street, New York—"A Lamp Book" (catalogue of Dietz oil and acetylene lamps).

The White Sewing Machine Company, Cleveland, Ohio—"Motor Cars for Pleasure Versus Motor Cars for Speed." (From the July number of the *World's Work*.)

We have also received a colored poster, "Rubber Man's Vacation," from the Goodrich Tire and Rubber Company, Akron, Ohio, and embossed and colored metal signs from the R. E. Dietz Company, 60 Lighthouse street, New York. The latter are intended for automobile stations.



United States Patents.

733,935. Vehicle Wheel.—John F. Barnett, Jr. West Suffield, Conn. July 21, 1903. Filed July 10, 1902.

733,948. Magneto-Electric Machine.—Daniel Drawbaugh, Eberlys Mills, Pa. July 21, 1903. Filed March 4, 1902.

733,949. Battery.—Daniel Drawbaugh, Eberlys Mills, Pa. July 21, 1903. Filed April 12, 1902.

734,040. Water Gauge.—Henry G. Brooks, Marshall, Mich. July 21, 1903. Filed March 7, 1903.

734,061. Roadway and Vehicle for Traveling Thereon.—John B. Hansler, Newburgh, N. Y. July 21, 1903. Filed October 2, 1902.

734,108. Plug for Pneumatic Tires.—Charles O. Tingley, Rahway, N. J. July 21, 1903. Filed April 29, 1903.

734,152. Hydrocarbon Burner.—Henry H. Ashlock, Clyde, Kan. July 21, 1903. Filed December 23, 1902.

734,194. Ball Bearing.—August Riebe, Berlin, Germany. July 21, 1903. Filed April 17, 1900.

734,209. Transmission Gearing for Automobiles.—Edgar Whitcraft, Brighton, N. Y. July 21, 1903. Filed October 21, 1902.

734,296. Tire.—Charles Bürger, Chêne-Bougeries, near Geneva, Switzerland. July 21, 1903. Filed December 15, 1902.

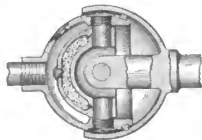
734,337. Spring Buffer.—Frank F. Keeler, Indianapolis, Ind. July 21, 1903. Filed April 1, 1903.

734,430. Rotary Engine.—Charles E. Reynolds, Woodson, and William E. Reynolds, Modesto, Ill. July 21, 1903. Filed May 20, 1903.

734,434. Pneumatic Tire.—William F. Schacht, Goshen, Ind. July 21, 1903. Filed May 25, 1903.

734,490. Universal Joint or Shaft Coupling.—W. O. Worth, of Chicago, Ill. July 21, 1903. Filed May 2, 1901.

The objects of the invention are to provide a universal joint in which all of the bearing surfaces are housed in a dust and water tight casing and to provide means by which all of the bearings of the said joints will be automatically lubricated. The construction of the joint is clearly shown in the cut, which is self explanatory.



No. 734,490.

734,490. Lock Lever.—M. N. Kirkhuff, of Canton, Ill. July 21, 1903. Filed April 8, 1903.

The object of this invention is to provide means for securely holding a lever at various minute differences in position.

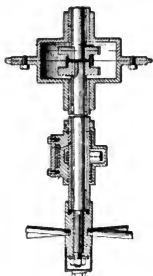
734,069. Force Feed Lubricator.—B. Ivor and F. S. Ward, of Chicago, Ill. July 21, 1903. Filed February 27, 1902.

734,084. Automobile Carriage.—C. J. Ollagnier, of Paris, France. July 21, 1903. Filed November 10, 1902.

The invention relates to motor vehicles in which all the road wheels are driven by the engine and in which means are provided for steering the front wheels.

734,080. Rear Axle Construction for Automobiles.—W. Morrison, of Chicago, Ill. July 21, 1903. Filed April 24, 1903.

The objects of the invention are to provide a simple and highly efficient construction, and to combine a divided or two part axle with a rigid or continuous outer tubular member.



No. 734,080.

734,029. Pump Mechanism for Steam Carriages.—R. H. White, of Cleveland, Ohio. July 21, 1903. Filed January 17, 1903.

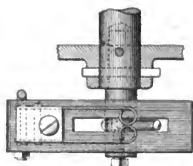
734,028. Air Pump Mechanism for Motor Vehicles.—R. H. White, of Cleveland, Ohio. July 21, 1903. Filed April 21, 1902.

734,415. Fuel Missing and Charge Controlling Device for Explosive Engines.—P. Gaeth and A. Griebel, of Cleveland, Ohio. July 21, 1903. Filed August 18, 1902.

The invention relates to improvements in hydrocarbon explosive engines, and the object is to provide a contrivance for mixing the fuel in proper proportions as to air and gas.

734,421. Fuel Governor for Oil Engines.—A. Krebs, of Paris, France. July 21, 1903. Filed November 10, 1902.

The invention relates to throttle governors and has for its object to insure that the composition of the combustible mixture supplied to the cylinder shall be constant. (This device was described in full in a recent issue of THE HORSELESS AGE.)



No. 733,894.

733,894. Current Breaker for Hydrocarbon Engines.—G. R. Albaugh, of Cleveland, Ohio. July 14, 1903. Filed February 16, 1903.

The invention relates to current breakers of explosive motors employing jump spark ignition. The half speed shaft of the motor is provided with a pin or finger, which is secured by a screw and may be adjusted lengthwise. This pin revolves between two flat spring contact members, which are riveted to a block, which, in turn, is held by a block of fibre loosely mounted on the shaft. Timing of the spark is effected in the usual manner.

733,406. Friction Clutch.—Ezra Liken, of Barkeyville, Pa. July 14, 1903. Filed July 3, 1902.

733,752. Sparking Device Governor for Gasoline Engines.—O. J. Root, of East Moline, Ill. July 14, 1903. Filed December 16, 1902.

The invention relates to hammer break ignition devices and has for its prime object to provide means for timing and tripping the igniter hammer. A further object of the invention is to provide mechanism that will hold the sparking device inoperative, so that sparking is prevented when the engine is running idle.

732,241. Device for Pumping Air and Water.—D. Vaniman and S. F. Sanger, of McPherson, Kan., and South Bend, Ind., respectively. June 30, 1903. Filed September 27, 1902.

733,108. Pneumatic Tire.—Robert A. Harris, Tucson, Ariz. July 7, 1903. Filed December 17, 1902.

733,229. Rotary Pump.—Charles W. Loomis, Lake Charles, La. July 7, 1903. Filed December 2, 1902.

733,365. Rotary Engine.—Alfred I. Osterlander, New York, N. Y. July 7, 1903. Filed November 28, 1902.

733,330. Muffler.—Anthony G. New, Woking, England. July 7, 1903. Filed December 30, 1899.

733,348. Antifriction Bearing.—George N. Toms, Boston, Mass., assignor to the Frictionless Roller Bearing Company, Boston.

732,109. Rotary Pump.—E. Patterson, of Crowley, La. June 30, 1903. Filed April 26, 1902.

732,181. Fuel Oil Burner.—T. E. Flaherty, of St. Louis, Mo. June 30, 1903. Filed September 26, 1902.

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...EVERY WEDNESDAY...

Devoted to
Motor
Interests

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For the issue of September 2, midway between the summer and the fall touring seasons, we announce a special Touring Number confined strictly to this popular and most enjoyable pastime. The recent growth of automobile touring in the United States, and the growing interest in it for all who are interested in the subject or who are susceptible to its charms and desirous of joining the increasing body of American auto tourists. One of the most interesting features of this number, naturally, will be the department set aside for the experiences of tourists on the road to all parts of the United States and in foreign countries. In order to make this department as novel and helpful as possible the editor invites correspondence from any of his readers who can contribute suitable touring experiences within the specified time. Instructional data or any amusing incidents relating to touring are also desired. It is our intention in our Touring Number to provide solid information as well as entertainment, and to stimulate among the American public the love of nature and the most convenient and modern mode of enjoying it—automobile touring.

Transformation of Hydrocarbons.

Among the hydrocarbons, acetylene has gained enormously in practical value in recent years, particularly through its extensive application to lighting purposes. It has also been experimented with for power purposes, but so far without any striking success. The prospects of acetylene in the power field seem to be brightest in such countries as Italy, where the price of gasoline is very high, and where, owing to abundance of water power, calcium carbide can be produced at low cost.

The drawbacks in the use of acetylene for portable motors, such as automobile motors, are that, owing to the rapidity of its combustion, the thermal efficiency is rather low; the production of acetylene cannot be sufficiently closely regulated for the variable demands of an automobile motor, and a considerable quantity of by-product to the fuel gas must be carried. The acetylene might be carried in the liquid state under pressure, but liquid acetylene is known to be dangerous, owing to the rapid rise of its vapor tension with temperature.

It has recently been found possible to convert acetylene into other carbon compounds, which are liquid at ordinary temperatures and pressures, and well adapted for use as motor fuels—such as alcohol and gasoline. Acetylene is the one of all the hydrocarbons which contains the greatest percentage of carbon, and to convert it into other hydrocarbons requires only its chemical combination with additional hydrogen, a reaction which can be readily brought about by the simple application of heat. The use of hydrogen is objectionable, however, and this objection has been overcome in a recent process in which nothing but acetylene is used, a blast of which is directed against a metallic surface kept automatically at a high temperature. The action seems to have some relation to that of spongy platinum on hydrocarbon gases, which is sometimes made use of for ignition purposes; a part of the acetylene is decomposed into its elements and the hydrogen thus liberated combines with the remaining acetylene, forming a liquid resembling gasoline in all its physical properties at least.

The discovery of this "transmutability" of the hydrocarbons may not entail any great direct commercial results, but is nevertheless most interesting as throwing additional light upon the peculiar physico-chemical action of certain metals and metallic compounds which has constituted one of the most important fields of chemical research in recent years.

Standard versus Narrow Tread.

A correspondent requests a discussion of the relative advantages of standard and narrow treads for automobiles. He has used both and is unable to tell from his experience which is the best.

The narrow tread is only employed for light runabouts, the object being to save weight. This is apparently the only advantage gained by the narrow tread. It may happen occasionally that the space

just inside a rut is smoother than the bottom of the rut, but this is the exception rather than the rule. A narrow tread necessarily affects the smooth riding qualities of a car in the same manner as a short wheel base. This may, however, not be of very great consequence in a car of the light runabout type the speed of which is limited, particularly on rough roads. A narrow tread vehicle is, of course, less stable than a vehicle of standard tread.

One possible advantage of the narrow tread vehicle is that it may be steered out of a rut easier than a car all the wheels of which travel in ruts simultaneously.

There is no doubt that in respect to easy riding and stability the standard tread has the advantage, but the saving in weight and cost effected by the use of narrow treads in small cars will most likely induce some manufacturers of this type to adhere to the narrow tread.

Pursuing the Wrong Course.

The application for an injunction to restrain the city authorities of Chicago from putting their numbering ordinance into effect has been rejected, as was to be expected. City numbering ordinances are not regarded by the great majority of automobilists as the proper method of regulating automobile traffic, a State licensing and numbering system being much preferable. However, the Chicago automobilists who asked for the injunction did not argue that numbering of automobiles was a subject coming properly within the jurisdiction of the State authorities instead of the municipal authorities, but based their contention on the ground that numbering automobiles was unconstitutional, for the reason that other private vehicles are not numbered.

Judge Tuley, in his opinion, held that the city had a perfect right to adopt measures to restrict the speed of automobiles, and to provide means for identifying violators of the speed ordinance. The reason that other private vehicles are not required to carry numbers was, he said, because the necessity for it did not exist.

It may have been observed that objections to automobile ordinances and laws generally originate among dealers and members of the trade. This may not be surprising, as the interests of the trade in the unhampered development of automobilism are far greater than that of the average private user, and the trade might therefore well be expected to take the lead in

protesting against and fighting all unreasonably restrictive measures. We believe it to be a serious mistake, however, for the trade to make war on reasonable legislation. License numbers have generally been acquiesced in by private owners, and we have never yet heard a valid objection to them. But if the trade persists in holding up numbering as a very objectionable measure, a section of the public will eventually be converted to that view, and then real harm will result. As long as private users do not object to carrying numbers, there is no reason why the trade should interfere with a numbering measure. A State system of numbering would undoubtedly be more satisfactory to all concerned, and if a bill providing for licensing and numbering should be introduced in the Illinois State Legislature and passed by that body next fall, Chicago would no doubt at once repeal its municipal numbering ordinance

Cleaning House.

The recent failures in the automobile industry have in a sense cleared the sky and placed the industry as a whole on a far more substantial basis. The unsoundness, financially, of many of the firms engaged in the manufacture of automobiles and parts has been notorious and has been the cause of the withdrawal from the field of many well established firms who started to do business with the industry. The demand for their goods was perhaps satisfactory, but collections were so slow and losses so heavy that they became disgusted.

These failures were, of course, in no way due to the formation of the Association of Licensed Automobile Manufacturers, as some may have assumed. They were the natural and necessary consequence of haste, folly and incompetence. It is highly probable, however, that the association will be instrumental in keeping the industry clear of irresponsible "mushroom" concerns in the future. If the association did not exist new schemes would no doubt be promoted as fast as the old bubbles burst, but the existence of the association will have a tendency to check promotion in this line. This ought to fully restore the confidence of manufacturers of machine tools and other articles required in the manufacture of automobiles.

An occasional housecleaning is essential in a well ordered and healthy household, and in the automobile industry it has come none too soon.

The Object of Road Racing.

Says the *Automobile Club Journal*:

"It is no exaggeration to say that the lessons of construction taught by the Gordon Bennett Race will save many lives. It was much better, for example, for the German firm to discover in a single day the defective character of their axles than to have the fact slowly forced upon them by many accidents to purchasers of their cars. Racing is still necessary to the evolution of the motor car."

The logic of this statement is not quite clear, if indeed there is any logic in it. It is difficult to see how these races promote the safety of automobiles when it is a well established fact that the machine which carried off the highest honors in this event has been responsible for more fatal accidents than any other.

As to the German firm discovering in a single day the defective character of their axles—the firm gave out a statement shortly after the race that its recent fire had obliged it to compete with "ordinary touring" cars, and to bring these within the weight limit it had been necessary to fit special axles of reduced weight. If this statement is true, the lesson regarding the axles would seem to have been unnecessary. At any rate, it would be no proof of an axle being too light for ordinary service that it was unable to withstand the strains to which it was subjected when running at between 70 and 80 miles per hour in Ireland, particularly when it is remembered that the strains due to the jolts increase as the square of the speed.

The same publication also makes the serious mistake of comparing automobile races to Admiralty trials of torpedo boats. The torpedo boat is built for war purposes, while automobiles are for daily use. The value of a torpedo boat depends very largely on the extreme speed of which it is capable, and it is therefore but natural that when governments take a torpedo boat over from the builders they subject it to a test in which the machinery is forced to its utmost.

Another very silly argument to justify road racing was recently advanced by an American contemporary, which stated that in order to make sure of the safety of steam boilers at, say, 200 pounds pressure per square inch, they were tested to perhaps 400 pounds. Now while steam boilers are tested to a higher pressure than they are intended to be worked at, they are not tested under steam pressure, but under hy-

draulic pressure, so there is absolutely no danger if they should fail to withstand the test. If an engineer should propose to test a shell boiler under steam at double or treble its working pressure he would be considered ripe for the insane asylum. An automobile test forming a parallel to hydraulic boiler tests would be to run the machine under double or three times its normal load.

Calendar of Automobile Dates and Events.

August 10-22—Tourist Motor Bicycle Reliability Trials.

August 14-16—Meeting of the Association of Licensed Automobile Manufacturers at Niagara Falls.

August 20—International Races of the Frankfurt Automobile Club, Frankfurt-on-the-Main, Germany.

September 4-5—Cleveland Races.

September 6-12—Vienna Automobile Week.

September 7-8—Detroit Races.

September 11—Syracuse Races.

September 16-24—English Reliability Trials.

September 19—Narragansett Park Races.

September 13 or 19—Empire City Track Races, Yonkers.

October 2—Brighton Beach Races.

October 5—Paris Cab and Delivery Wagon Trials.

December 10-25—Paris Automobile Exhibition.

The Measurement of Grades.

By ALBERT L. CLOUGH.

There is considerable misunderstanding current as to the method of measuring road grades and a general tendency to overestimate the incline of hills. The matter, however, is a very simple one.

Grades are usually measured on a percentage basis and this percentage is the ratio of the vertical distance climbed to the length of the horizontal distance traveled. A horizontal base line is assumed originating at the commencement of the incline, and all grades are referred to this. If a perpendicular is erected to this horizontal line, the distance along it from its base to the point where it intersects the grade itself is the rise. The ratio of this vertical rise to the length of the base line from its beginning to the foot of the perpendicular is the measure of the grade. Of course, the ratio of the difference in height between two neighboring perpendiculars, to the horizontal distance between them, is the measure of the grade. If two perpendiculars be chosen 100 feet apart and one of them be 20 feet and the other 30 feet in height, the rise in the 100 feet of horizontal distance is 10 feet and the grade is one of 10 to 100 or 10 per cent.

If the incline is not uniform it is necessary to choose the perpendiculars closer together than 100 feet in order to obtain the per cent. of grade with sufficient accuracy,

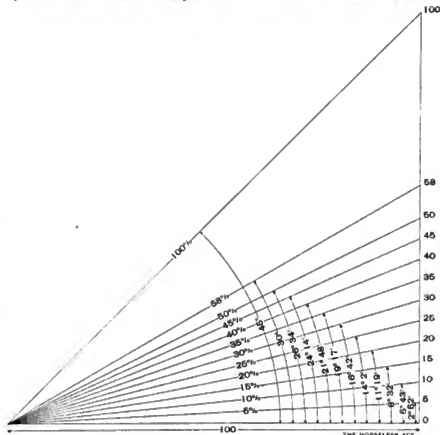
for it is simply the average grade between the perpendiculars which is obtained by this method.

In the accompanying diagram a horizontal base line has been drawn, and grades of percentages varying by 5 per cent. stages up to 50 per cent. have been represented by inclined lines radiating from the left hand end of the base line.

It is very common to find people confounding the percentage of a grade with the angle of incline which it makes with the horizontal. The angles corresponding with each percentage of grade here represented are marked upon the diagram for purposes of comparison. It will be seen that the percentage of the grade increases in an entirely different ratio from the angle of

horizontal distance to be greatly exaggerated and leads to the estimation of the per cent. or the angle at an excessively high value.

In rolling country, where one is constantly descending and ascending hills, the incline which one is approaching is likely to be overestimated on account of there being no horizontal base line at hand to assist in the estimate. One is likely to unconsciously assume the down grade upon which one may be as horizontal, and thus its decline is added to the incline of the rise which one is approaching. About the only condition under which one can make even a fair approach to accuracy in the estimation of a grade is by viewing it from a point at right angles to the length of the road and from a horizontal surface. This condition is sel-



THE MEASUREMENT OF GRADES.

slope, and, in fact, the per cent. of grade is simply the natural tangent of the angle of incline.

A grade which makes an angle of 30 degrees with the horizontal is equivalent to a 58 per cent. gradient. This is interesting, as one sometimes hears people speak of hills which they estimate to have nearly a 30 degree slant. These are instances of exaggeration. A 45 degree slope is equivalent to a 100 per cent. grade, or, in other words, the vertical distance is equal to the horizontal distance.

The usual cause of the almost universal overestimation of gradients lies in the fact that when looking up a hill the length of the road itself is greatly foreshortened, while the vertical distance is projected at its full value. This causes the apparent ratio of the vertical distance to the hori-

dom realized. In cities, where buildings closely line the streets, a fair idea of the grade may be obtained by noting the angle between the sidewalk level and the top of the underpinning of the buildings. A fairly close estimate can sometimes be obtained in this way.

The gradometers which are on the market consist of a spirit level which is made in the form of an arc, lying in a vertical plane along the length of the car. The gradometer should be attached so that its base is level when the vehicle is horizontal. The bubble should then stand at zero. In ascending or descending a hill the bubble moves in the appropriate direction along a scale which is graduated in per cent. The accuracy of the readings of gradometers is somewhat affected by the loading of the vehicles upon which they are placed.

Setting Slide Valves of Automobile Engines.

By REYNOLD JANNEY.

In a non-reversible steam engine, where only one eccentric operates the slide valve, the setting of the valve is a very simple

The eccentrics are set a little more than 90 degrees ahead of the crank, one being called the forward eccentric and the other the reverse. When the crank turns in the direction indicated by the arrow, the eccentric X is active and operates the valve, while V is running idle. If the bell crank

various problems involved, but even after their application the designer is not sure of the exact result of his design until he has tested it by a skeleton model or in an engine. It is, however, not the purpose of this paper to treat of the design of the engine, but only of the setting of the valves. The location and throw of the eccentrics have all been determined; the length of the links and point of suspension cannot be changed; the ports have fixed positions. The engine comes to the automobilist unchangeable except by a very few adjustments, by means of one or two threaded parts, unless he should wish to change the dimensions of the valve or port by the use of a file. Once the design is completed the adjustments necessary are made at the point K, where the valve stem H screws into the valve rod R and is locked by the nut K.

Let us take it for granted that the engine as placed in our hands is properly designed and machined, and we are to set the valves. It is well to adjust the valves for one cylinder at a time. Remove the steam chest cover so as to expose the valves to view. Set the reverse lever in the extreme position for running forward. This will bring one of the eccentric rods, the link block and the valve stem almost in a straight line. Revolve the main shaft of the engine forward until the crank is on a centre—that is, stands in a straight line with the connecting rod and the piston rod. If the crank is at its lower centre the valve will stand in the position indicated in Fig. 2. The upper port should then just begin to open. If this is not the case, the nut K should be loosened and the valve stem H screwed into or out of the rod R until the port is just opening. Revolve the shaft of the engine 180 degrees, until the crank stands on the opposite centre. If the first setting of the valve is right the lower port will now be on the point of opening, but if the port is already open or lacks somewhat of opening, the stem should be further adjusted to the amount of half the distance of the edge of the valve from the edge of the port. The crank should then be revolved to its first position and the valve examined again, to see if the new adjustment is correct. If not, the same operation should be repeated until the "phase" of the valve is the same for the two extremes of the crank position.

Steam engines are usually so designed that in the crank positions mentioned above the steam ports are open a little. That is, steam has already begun to enter the cylinder when the crank reaches the dead centre. The amount the port is open when the crank is on its centre is called the lead. If the valve edge is exactly on the edge of the port the lead is zero; if the valve overlaps the port and still lacks somewhat of admitting steam the amount of the overlap is called negative lead. Negative lead results in poor economy. The steam enters the cylinder so late that its full force is not realized, particularly if the engine is run-

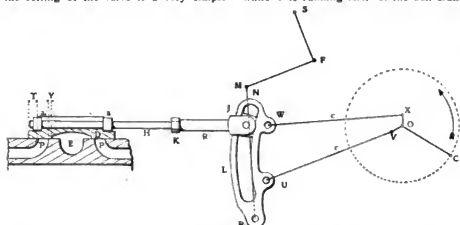


FIG. 1.

matter. But where eccentrics operate the valve through a reversing link the motion is extremely complex and the setting much more difficult. Every change in the position of the reverse lever alters the valve phases, and the reverse action is different from the forward.

Before attempting to discuss these peculiarities it will be well to have clearly in mind the plan and movements of the valve connections. As the Stevenson link motion is the one in common use, we shall confine our attention to this device.

In Fig. 1 PP are the steam ports and passages leading from the steam chest to the ends of the cylinder. E is the exhaust port, D the slide valve and H the valve stem passing through a groove in the slide valve and holding the valve between the two nuts a a'. R is the valve rod, which is internally threaded at one end to receive the valve stem. The latter is locked by the nut K, and forked at the other end to straddle the link L and link block B, the latter being pivoted in the fork by the pin J. The rod slides through a guide which is usually a part of the engine frame. The link is suspended at the pin R by the hanger N to the end of the bell crank M. The bell crank is fulcrumed at F, and is sometimes called the tumbler. The link is also connected with the eccentrics X and V by the eccentric rods c and c' and the pins W and U. The crank C extends from the main shaft O opposite the eccentrics.

MFS be turned about F so as to lift the link into such a position as to bring the block B and the rod c' nearly in line, V will become the active eccentric and the engine will be reversed. By means of the reverse lever S the link may be set at any position between the extremes and one or the other of the eccentrics will predominate in controlling the motion of the valve according to whether the block rests in the upper or lower half of the link. If the block rests in the middle of the link, the valve will be operated by both eccentrics conjointly, but will not be moved far enough either way to open the steam ports, or at least not so as to run the engine. The peculiar effect of holding the link at an intermediate point will be noted later.

It will be noticed that the slide valve is much longer than is necessary to cover the ports. The amount of overlap at each end, T, when the valve stands central is called the "steam lap," or "outside lap." The exhaust arch above the exhaust port E is a little shorter than the distance between the inner edges of the steam port, and the distance Y is called the "exhaust lap," or the "inside lap."

The designer of a Stevenson link motion has a number of complicated problems to solve. Even the slightest alteration in any dimension and in the location of the centres of motion materially affects the steam distribution.

Formule have been deduced and diagram methods invented for the solution of the

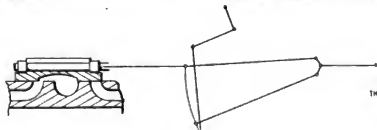


FIG. 2.

THE HORSELESS AGE.

ning at considerable speed. As the throw and position of the eccentric are determined by the manufacturers the setter of the valves has at his command only two remedies for negative lead. He may shorten the valve by dressing off one or both ends, or he may widen the steam ports by cutting away the steam edges. But it should be remembered that in producing lead by this means the steam cut-off is extended to a later point in the stroke of the piston and the benefits of expansion are lessened.

Thus far we have confined the setting to one particular position of the reverse lever, the extreme forward. In automobiles the reverse position need not be considered. There are irregularities in the Stevenson link motion at the very best, and if it is possible by design or adjustment to confine these to the reverse action of the engine, leaving the forward motion comparatively regular, it is best to do so. This is one of the reasons for suspending the link by its reverse or lower end, as shown in Fig. 1. If the point of suspension were near the middle of the link, as in locomotive practice, the forward and reverse phases of the valve action would be almost the same; but by suspending the link by the reverse end most of the slipping and wear of the link block, together with the larger share of the valve irregularities, is limited to the reverse action.

So far we have adjusted the valve so that the lead is equal for both centres of the crank. If the crank be turned and the valve watched, to note the points of steam cut-off for each end of the cylinder, they will be found unsymmetrical. If marks had been made on the edge of the valve showing the width of the exhaust arch, and also on the side of the steam chest showing the location of the ports, the exhaust would be found as unsymmetrical as the steam cut-off. If it were desirable always to run the engine with the link in its farthest forward position, it would be necessary still further to continue the adjustment by compromising the equality of lead a little to secure more satisfactory equality of cut-off. But it is not desirable to run an engine in this extreme position except when just starting or going slowly under a heavy pull. In such a position the lead is usually designed to be zero or very small—perhaps not more than a hundredth or a sixty-fourth of an inch in a small automobile engine. It is therefore desirable that the adjustment be made for a position of the block somewhat nearer the middle of the link. Moving the block inward from the extreme position is called hooking up the reverse lever. The effect is to increase the lead, and at the same time shorten the admission of steam in the link, giving a much greater expansion, and consequently higher economy in water and fuel.

It may be well to remark that the increase of lead in hooking up the reverse lever is due to the connection of the eccentric rods. In Fig. 1 the eccentrics X and V are opposite the crank, that is, are more

than 90° from the crank, and the amount the angle exceeds 90° is called the angle of advance. When the crank is on the centre away from the cylinder the eccentric rods are so connected with the link as not to cross each other, although they will cross when the crank is turned to its centre toward the cylinder. If the eccentric rod C had been connected to the link at U instead of at W and C' at W, they would cross each other with the crank in the position of Fig. 1. In this case hooking up the reverse would decrease the lead. Novices sometimes make the mistake of connecting the rods in this manner, and wonder why the action of the engine is not satisfactory.

The best position for the reverse lever can be determined only by trial. But it may be assumed that the engine will run smoothly when the link block stands about half way between the middle of the link and the end. Set in this position the valves may be examined anew for the different positions of the crank, to see if the valve phases are as nearly symmetrical as possible. If the phases are not satisfactory the same method of readjustment should be employed as at first.

In large engines the valves are usually set according to the card register of an indicator, but this is not practicable for small engines such as are used in automobiles.

The Steadiness of Racing Cars.

By J. S. V. BICKFORD.

Two facts were noticed by most of the spectators at the starting and finishing points of the Gordon Bennett race:

1. All the cars seemed to be bounding about over the road.

2. This was not nearly so much the case with some as others.

I am inclined to think that the roughness of the road alone does not nearly account for this eccentricity of movement. The divergence from the straight line did not seem to necessitate the use of the steering wheel, but seemed to partake of the nature of a vibration, the course being slightly sinuous. It will be of interest to examine the reasons for this unsteadiness in running.

I believe that the trouble is due to two, or perhaps more, reasons:

1. The gyroscopic effect of the flywheel and wheel as pointed out by E. J. Stoddard in *THE HORSELESS AGE* some months since.

2. The virtual shortening and lengthening of the steering connections due to the action of the springs.

It will be remembered that Mr. Stoddard showed that even with an ordinary touring automobile this gyroscopic effect might be considerable when the front wheels rise to an obstruction; what then will be the effect on a racing car traveling 50 to 80 miles per hour? It is certain

that in some cases it must be enormous. Is there any remedy?

I think that it will only be possible to answer this question by actual experiment, but it is possible to indicate the direction which investigation might take.

The only methods which occur to me are as follows:

1. Use two flywheels running in opposite directions. The gyroscopic effect will then be in opposite directions and will result in internal strains only, no turning effect on the car being possible.

2. Balance the engine on springs apart from the body of the car and communicate the motion by universal shafts.

3. Abolish the flywheel altogether.

Of these the first seems to me the most promising, the second method being in all probability too complicated, while method No. 3 would not be possible with the present type of internal combustion engine.

It is not at once apparent how the two flywheels could be arranged, but I am inclined to think that it could best be done by having two sets of separate engines rotating in opposite directions and each one driving one driving wheel, so that the differential gear would be entirely done away with. It is almost possible that in this way the complication of the car would be diminished.

Let us turn now to the other cause of swerving—the angularity of the steering gear connection. The sketch will make my meaning clear. Everything is of course diagrammatic. It will be seen that the steering gear end A is above the end B which is attached to the road wheel swivels. Now a moment's thought will show that when the point A moves vertically downward, as it would if the vehicle were to pass over an obstacle (or, what is exactly the same thing, the wheels would rise vertically upward), the point B is moved slightly in the direction of the arrow and comes back again to its original point when the obstacle is passed. This, of course, deflects the car from its straight course, and results in the path traveled being sinuous. Apart from the danger of this motion it is also certain that this irregular movement must result in much loss of power and a reduction in the possible speed.

There are several ways of overcoming the above mentioned movement of the steering gear. The old Benz arrangement was to transmit the power to the steering wheels through a small carriage spring, as shown in Fig. 11, the connection from the steering worm and sector being attached to A, while the connection to the steering swivel is fastened at B. The upper part of the spring C is attached to the carriage body and the under part to the front axle. It will be seen that movement of the springs has no effect on the steering.

Another method of overcoming this difficulty would be the use of a special radius rod communicating between the road axle

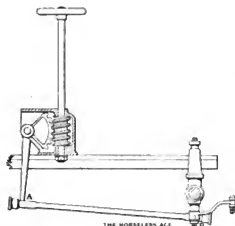


FIG. 1.

and the steering worm and sector case. This would maintain the distance between the case and the axle rigidly the same, irrespective of springing, and in consequence there could be no motion of the wheels.

Still another method would be to transmit the motion to the wheels by a rotating telescopic shaft in the same way as the feed of a milling machine is arranged.

It will be noticed that these two reasons for the sinuosity of the course of a racing car are to some extent opposed to one another in their cure. Thus the gyroscopic effect of the flywheel might to a great extent be overcome by having very elastic springs on the car itself. This would admit of the road wheels springing up and down to a great extent without moving the plane of rotation of the flywheel. Of course, this would not alter the gyroscopic effect of the road wheels themselves, but it hardly seems possible in any practical way to eliminate this. It would be theoretically possible to mount a dummy wheel inside the road wheels rotating in the opposite direction, but it would obviously be out of the question to do this in practice. The only thing which can be done here is to make the wheels as light as safety will allow. On the other hand the use of long elastic springs greatly aggravates the steering connection difficulty. This difficulty increases very rapidly indeed as the play of the spring increases, and becomes very serious after the first inch or so of motion. If it were not that automobiles are usually driven over bad ground with great care and at a slow pace there would be many more accidents from this cause than there are, and it may reasonably be expected that as construction is improved and it is found possible to ill-treat an automobile as a carriage is ill-treated by fast driving over bad ground, it will become necessary to tackle the problem.

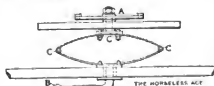


FIG. 2.

Maintenance and Repairs.



XII.—Repair of Broken Gear Teeth.

By W. O. ANTHONY.

With some of the lighter planetary transmission gears with cast iron gears of very small dimensions it is not uncommon for the teeth to break out. As it sometimes means a considerable delay in getting new gears, the machine may be put in commission very quickly by doing what is termed "pegging" the teeth. This consists in filing off the broken teeth and drilling and tapping holes in the centre of the original tooth positions as closely together as possible, but with space enough between them to prevent liability of breaking through.

For the "pegged" teeth use round steel pins, of a diameter equal to the thickest portion of the teeth, or a little thicker, if anything. Tap the holes not quite through the rim of the gear and thread the steel rod

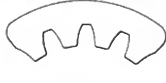


FIG. 33.



FIG. 34.



FIG. 35.

far enough up so it will just bottom in the threaded holes and leave none of the thread outside. After making up very tight, saw original teeth. Now cut a template of tin, to cover three or four of the whole teeth.

This is shown in Fig. 33 and may be conveniently laid off by marking the outlines of the teeth, laid upon a piece of tin, with a fine, sharp scriber. Mount the gear wheel (with studs all inserted) upon a mandrel in the lathe, and, taking very light cuts, turn off the ends of the studs to the same height as the old teeth. Now file the faces of the teeth until the template will fit them perfectly, allowing it to project over at least one of the original teeth as a guide. If this work is carefully done, the job will be practically permanent, and the writer has known of cases where some of the remaining cast iron teeth would break under further strains, where the "pegged" teeth would remain intact.

If the gears to be repaired by inserting new teeth are of such a form that to replace one gear wheel means the replacing of several, as, for instance, when three or four are made integral upon one sleeve or shaft, the expense of such replacement cannot be ignored. In such a case the repair should be made with the intention of its being permanent, and a better although more difficult method consists in dovetailing steel pieces into the rim of the gear wheel, which pieces are tightly fitted to begin with and secured against any possibility of loosening by riveting or "pinning" over the ends of

the pieces. These pieces are then filed to fit a template, as was described for the "pegged" teeth. The two forms of repairs are shown in Figs. 34 and 35, respectively. In filing the grooves for the dovetails, as shown in Fig. 35, the ends of the grooves should be made just a trifle wider than the middle portions, and after fitting the teeth their ends should be hammered sufficiently to spread them into the enlarged portions, the pieces having been cut a trifle long to permit of this.

III Luck or Constructional Failure?

The *Automobile Club Journal*, referring to the Gordon Bennett Cup race, says: "From this race alone we have seen that a sheer upset in one case, misdirection in another, and tire troubles in a third, cost us the cup; but none of the constructional failures which eliminated two out of three of the German cars and one of the Americans." All reports that have come to our notice stated that one of the English cars failed by breaking its steering gear, and if this is not a constructional failure we are

at a loss to know what constitutes such a failure. It is, in fact, the most dangerous failure imaginable.

Automobiles in Sheffield.

According to the Sheffield (England) *Daily Independent* there is a much better feeling among the general public and motorists in that city than in the southern counties of England. Says this paper:

"From most parts of the country come grateful complaints of the ill doings of motoring terrors of the highways; but about Sheffield automobilism there seems to be an air of serenity that is not in accord with the reputation that the 'sport' has made for itself elsewhere. The automobilists of Sheffield, indeed, impress one as a quiet people and a modest. Their cars are engines of dread, not to the general public, but to the drivers themselves. They pilot the machines cautiously and bashfully, backward and forward along suburban highways. They have numerous breakdowns, and are compelled to probe anxiously into the inner mysteries of the apparatus. The public, which likes to look at breakdowns of any description, enjoys a motor car breakdown above all things; it attends such functions in large numbers, and is moved to eloquence. So far Sheffield people have seen more of the penalties than of the pleasures of motoring. They are not sorry."

TOURING IN

AMERICA.

VI.—Connecticut.

By C. H. GILLETTE.

In the good old summer time the Eastern tourist's thoughts turn to New England, to its snow capped mountains and cool and quiet resting places by the sea. Old fashioned though New England summering places may be, they still have many charms for those who are "worked out" or "played out," and so, as in the past, the White Mountains, the Maine lakes and trout streams, her islands and her beaches, the thousand summering spots that dot the map of Massachusetts, all have their quota (and often more than their quota) of pleasure seekers. Owing to the special timeliness of this theme, I have changed my plan for these articles and purpose dealing now with the various ways of getting into this New England territory from New York and beyond, through the Connecticut gateways, which are in many respects the most logical routes to pursue.

In a previous article on the Berkshires the routes from New York to that territory

were described. Two of them were given, one being through Connecticut, along the Housatonic River. The route up the Hudson to Poughkeepsie and from there across to Lakeville, Conn., and then on to the Berkshires is probably the most popular way of getting into New England, because the route from the Berkshires is a comparatively easy way to cross to Eastern Massachusetts and continue from there on up to the White Mountains and into Maine. Connecticut, however, offers the most direct routes to Boston and Eastern Massachusetts, and as it makes an especially attractive touring ground, it seems best to describe its routes in full.

The through routes in Connecticut are rather peculiar in location. There is a route along the Sound from New York to New London. Running north from this into Massachusetts are three cross routes—one starting at Norwalk and following along the Housatonic Valley into the Berkshires; another branching off at New Haven and running through Hartford and then along the Valley of the Connecticut to Springfield; and the third from New London along the Thames River and the Quinebeaug Valley to Worcester. Of these three cross routes, the middle one—that is, the New Haven-Hartford route—is far and away the best for those who seek good

roads; but the other two offer more attractive scenery.

These routes are by no means the only available ones in Connecticut. There are many cross routes running in all directions through the State to various interesting localities and connecting all of the larger towns.

ALONG THE SOUND.

The route from New York to New London, which can be continued on to Providence and Boston, is probably the most direct road to Boston, and would doubtless be used much more if it were not for the poor roads between New London and Providence. The road is excellent as far as New Haven, being macadam nearly the entire distance. It follows the Sound quite closely, passing through New Rochelle, Port Chester, Greenwich, Stamford, Norwalk, Bridgeport and Milford. Although there are many turns in the road, requiring rather complete running directions, it is not a difficult road to follow and offers, in addition to good roads and easy grades, splendid accommodations in the way of hotels and stations.

From New Haven to New London the road for the most part is good, although in places it is only a fair dirt road. There are occasional stretches of macadam and the grades, although heavier than between



AN ATTRACTIVE BIT OF SCENERY IN ONE OF HARTFORD'S NUMEROUS PARKS.



THE STATE CAPITOL AT HARTFORD.

New York and New Haven, are not absolutely deterrent. It is an interesting route and passes through many attractive old towns, such as Branford, Guilford, Clinton and Saybrook. It was at Saybrook, for instance, that Yale College was founded; it is one of the oldest towns in Connecticut.

There are large summer hotels in nearly all of these towns, many of which are making a special effort to provide accommodations for automobiles. In fact, throughout Connecticut it will be found that hotel keepers are alive to the automobiling situation and are making ardent efforts to cater

to tourists who affect this method of locomotion. Connecticut was one of the first States to show this general hospitality, and this fact should be borne in mind by broad minded tourists interested in the future of the sport.

From New London on to Providence there are two routes—one through Stonington and Westerly, from which latter point it is only a few miles to Watch Hill on the Sound, and then through Kingston, Wickford and Appenaug to Providence. There are some rather heavy grades in the vicinity of Kingston and the road is dirt and sand.



A GOOD ROAD FOR AUTOMOBILES.

It is, or was recently, in none too good condition.

From Kingston an ordinary road leads south through Wakefield to Narragansett Pier and at Wickford the railroad connects with the ferry for Newport.

For summer travel this route along the Sound from New York to Providence is especially attractive, as there are watering places every few miles, with splendid summer hotels and lots of live amusements. The road for nearly the entire distance follows within a mile of the water and there is hardly any spot where the hills do not rise almost abruptly from the Sound.

UP THE HOUSATONIC VALLEY.

There are many interesting spots along this road which can be easily reached. The road is free from objections, either as to its condition or grades, and it is destined to become a popular alternative for the Hudson River route to the Berkshires.

Starting at Norwalk and running north to Danbury, one reaches the foothills of the Berkshires, and from there on the scenery is delightful. An interesting side trip from Danbury is out through Bethel into Putnam Park, where there is an interesting statue of Israel Putnam. The park itself is in part the old Israel Putnam farm and is of considerable historic interest. From Danbury the route is through Brookfield, then along the Housatonic River to New Milford.

New Milford is being rebuilt at present, it having been visited last winter by a most disastrous fire which destroyed nearly all of the business portion of the town, including the hotels.

From New Milford the road follows the river very closely, first on one side and then on the other, all the way to Great Barrington and Pittsfield. From New Milford it is possible to reach Litchfield, the highest town in Connecticut. Litchfield is an attractive summer place and its situation in the mountains near Bantam Lake is ideal.

Lakeville is but a short distance from Falls Village, which is on the direct road to Pittsfield. There is little macadam on this route, the road for almost the entire distance being an ordinary dirt road, but kept in very good condition, and following so closely the river, the grades are not at all heavy. The hills rise abruptly on either side of the river and every few miles one finds attractive waterfalls or rapids.

THROUGH HARTFORD TO SPRINGFIELD.

The middle route through Connecticut, starting from New Haven and running north through Meriden and Hartford and from there along the Connecticut River to Springfield, is the best known of the Connecticut routes, and offers the best roads, hotel accommodations and repair facilities. New Haven makes a good stopping point for the first night out from New York, and with its famous green and Yale campus it is of more than ordinary interest.

From New Haven the route is through Wallingford (in the vicinity of which town

there is a short stretch of poor road) and Meriden; then on through New Britain to Hartford. The road beyond Meriden is macadam nearly all the way and there are no grades of consequence.

Hartford is considered one of the most beautiful cities in New England and has a magnificent system of parkways, all of which are open to automobiles. The State capitol in Hartford is one of the features of the city and in every direction, for many miles, its gilded dome is a landmark and guide to tourists. There are many spots of historic interest in and about Hartford and many routes out from Hartford to attractive inns and other stopping points.

The run to Farmington, for instance, one of the oldest towns in the State, as well as one of the most beautiful, is very attractive, and the accommodations there at Elm Tree Inn are excellent. The run south along the river through Wethersfield, where the State Prison is located, and then on through Rocky Hill and Middletown, is good for the entire distance. This route can, in fact, be continued on the Sound, following the river for the entire distance to Saybrook. The roads are not of the best, but the inconvenience is more than compensated for by the scenery.

The beauty of the Connecticut River in this vicinity is too well known to require more than passing mention here.

From Hartford to Springfield is an almost direct road running through Windsor and Windsor Locks. Beyond there are two routes, one on either side of the river. The distance is the same by either and there is very little choice as to condition, both being good. The accommodations in Hartford and Springfield are excellent. Both cities contain unexcelled stations and hotels and a night stop can be made conveniently in either place.

From Springfield the route can be continued north along the river to Greenfield and on into Vermont; or, if Boston be the objective, the main road can be followed through Palmer, Warren and Spencer into Worcester and on over beautiful macadam into Boston. The route here described is by far the most convenient between New York and Boston, both as to roads and stopping places, and it is used more than the Shore Line.

FROM NEW LONDON TO WORCESTER.

There is an almost direct route along the Thames River from New London to Norwich. It is dirt and macadam in fairly good condition, and although there are some hills approaching Norwich, they are not difficult to climb. From Norwich there is a fairly good dirt road leading through Jewett City to Plainfield and Danielson, one of the principal towns in this part of the State. There also is a fairly good road from Norwich to Willimantic, that thriving manufacturing town, and from there to Hartford the way leads through one of the most picturesque portions of the State.

Putnam is just beyond Danielson, over a good dirt road. Thence the road is al-



LAKE CHAUBUNAGUNGAUG, NEAR WEBSTER, MASS.

most direct through Webster and Oxford and into Worcester. The roads from Putnam are not only fair, but the route follows the railroad very closely and there is a plenitude of conveniences for the tourist.

The Quinnebaug River, which the route practically follows from Norwich, is fully as picturesque as the Housatonic, although not quite as large a stream. This portion of the State offers an even greater variety of scenery than the western part. There are plenty of small lakes and ponds. The route passes quite near the Rhode Island line and there are two routes branching off from it to Providence, one from Plainfield

and the other from Putnam, either one of which is comparatively good, and both of which run over delightful country.

The Plainfield route is very often used in going from Providence to New London, in order to avoid the bad grades and the poor roads in the vicinity of Kingston and Wood River Junction. At Webster, just across the Connecticut line, is an interesting lake, the Indian name of which was Chaggaggagoggmanchauggagaggagun-gamaug. This name having been found a little difficult to pronounce, it has been shortened for convenience to Chaubunagunganaug. There is some question among



A VIEW OF THE ROAD ALONG THE HOUSATONIC.

skeptics as to whether this entirely relieves the strain, and vacationists in the vicinity have been known to cut the Gordian knot by calling it "Chaub." In spite of its name it is a particularly attractive stop and well worth a short side trip. There are many of these ponds and lakes throughout the State, and with plenty of rivers, such as the Housatonic, Connecticut and the Thames, there is enough of water to give variety to the hills. In no part of the State are the mountains very high, however, the country being rather rolling than mountainous. From the Connecticut, which divides the State almost in half, the hills rise higher and higher on either side, although on almost all the routes the grades are comparatively easy.

There is no direct road across the State from east to west, although one can travel from Danbury in the southwestern corner to Danielson on the eastern border, the route being through Waterbury, Hartford and Willimantic.

Connecticut has only just started to build State roads, but is making excellent headway, and within a short time all of the routes above mentioned will be macadam from start to finish. Most of the highways, however, are kept in excellent condition by the towns through which they pass and it is not difficult to reach almost any point in the State over fairly good dirt roads.

Connecticut is apt to be overlooked as an attractive touring ground, considered in comparison with some other sections in the East. But as it affords all of the facilities for convenient touring as well as much in the way of delightful scenery and points of interest, there is no reason why it should not be one of the most popular territories. The State has now a fairly liberal automobile law, one very good feature of which is that it recognizes the license numbers of other States. This recognition is something which should be included in every State registration law, as it is extremely inconvenient for an automobilist simply passing through the State to be obliged to send a week or so in advance, for a license and number.

Connecticut is rich in scenes of Revolutionary and Colonial interest. In Hartford there stood until a few years ago the famous old Charter Oak, in the hollow trunk of which the State Charter was hidden after having been stolen from the Assembly Chamber, when its surrender was being demanded by a representative of the King. From end to end the State teems with legend and story which the patriotic tourist will take pleasure in hearing told. It will take little urging to get the native born Nutmegger to telling the Colonial and Revolutionary lore of his own locality.

The London General Omnibus Company has been forced to discontinue running its motor omnibus, owing to its width.

LESSONS OF THE ROAD

Auto Experiences in Indiana.

BY A PHYSICIAN.

In August, 1902, I invested \$750 in a runabout auto. The parties from whom I purchased it were to furnish a competent man to teach me how to run the machine and how to take care of it. In due time I was notified that the machine had arrived in the city, a distance of 40 miles from my house. I went up on the early morning train and went into training on the fine streets of the city, and soon learned to run the machine forward and backward, stop, start and turn around.

The next morning the chauffeur and I started for my home, the road being gravel pike all the way. The weather had been very dry for several weeks, and the pike was covered with dust, deep and full of gravel. We made fairly good time until we were 14 miles out, when, as we approached the foot of a hill, the wagon, without any interference on our part, slowed up and stopped. The chauffeur tried the batteries, the spark plug, and looked to see if there was sufficient oil being fed into the cylinder. Everything seemed to be right, but the wagon wouldn't move. On still further inspection we found every part of the machinery covered with gravel, particularly the chain and sprockets. We had 2 or 3 quarts of oil with us, and used it to flush the gravel out of the mechanism. We got started again and then ran along very well for 10 miles on better roads free from dust.

Just after having passed through a town of considerable size the wagon again stopped, and after an hour of crank turning and sweating, cleaning out, and—well I don't really know what all the chauffeur did do—I told him to examine the vibrator; so he turned the crank around and found there was no buzzing. On examining the vibrator he found a small gravel stone wedged in behind the spring. He removed it, and we had no further trouble on our homeward journey.

The chauffeur was to stay with me until I was satisfied that I could run the machine alone. At noon on the third day he said he would go home on the evening train, but would clean out all the gravel in the machine and place it in first class order before leaving. After he had removed the body of the machine a small boy noticed that one of the links of the driving chain had parted in the eye and was open about a sixteenth of an inch. I had the chauffeur telephone for a new chain, and it came the next morning. However, before it arrived the chauffeur took the wagon out on the road with the old chain, taking a farmer with him who weighed about 240 pounds. They were speeding along at about a 15 mile clip

when the chain parted, gathered up in the case of the sprocket wheel, tore the sprocket wheel all to pieces and ruined the axle. The agents notified the manufacturers, who furnished a new axle and sprocket wheel. It was about one month before I received them, when the same man came down and assembled the wagon. This time he started me out alone to "paddle my own canoe."

For about one month I had smooth sailing. Up hill, down hill, over stony roads or on the plains—the wagon never failed me. I felt the master, it my willing servant. But the best expectations of men sometimes miscarry. Once I was about 4 or 5 miles from home, running at a fair gait, when I heard a pounding inside of the wagon. I stopped and looked it all over, but I could not detect what caused the pounding. I started it again, and again it pounded. I then moved the car slowly, gradually going faster to about an 8 mile gait, but it kept pounding until I got home.

I met an old engineer and had him listen to the noise. He told me very soon that it was a broken piston pin, and when it was removed we found one of the piston bosses broken. So the piston was sent away and a new one returned. The man who was sent to adjust it sawed the bosses down quite considerably, put the new pin in place and ran about 2 miles (the engine knocking all the time), when the new piston also broke. The piston, with pin and all, was returned to the manufacturers, who in turn sent a new piston, etc. The same man came again and adjusted the new piston and started the machine. Now it would not pull up hill, although it did fairly well on level, smooth ground, and, like a barrel, rolled best down hill. The knocking kept up, but not so loud. Efforts to make the wagon pull were continued about two weeks, when the man gave up in disgust. Then I had a man sent from the factory, and as soon as he saw the machine start he told me that the cylinder leaked, as shown by the smoke issuing from under the seat. On examining the cylinder he found two grooves the length of the piston stroke, about one-thirty-second of an inch deep and as wide as the piston pin, cut into the cylinder wall. He had the factory send an entirely new engine, and also came and fitted it up for me.

By this time the rainy season had set in and I put the wagon on trusses and let it stand until spring. The man from the factory did not get the wagon to work on the road, and when I took the wagon out it still lacked the power that it should have had, but the knocking was gone. I had a local mechanic look the machine over, but without any results.

I then felt for the first time that if I was to get any benefit out of my wagon I must learn to understand it myself. So I went through the files of THE HORSELESS AGE, reading carefully every one of the "Lessons

of the Road" and gathering points therefrom whereby I have been able to locate any difficulty that has since occurred. In many cases I could adjust it myself and, if not, I could point out the trouble to the mechanic here and have it adjusted.

On the morning of June 18 last I had a peculiar experience. I started into the country at 3 a. m. in my auto, with my lamps ablaze, little expecting to meet anything on the road at that early hour. I was running at about a 16 mile gait, every little while passing through clouds of dense fog, so that I could not see to feet ahead. As I entered one of those cloudlets I saw, to my horror, the road literally covered from side to side by a lot of fat hogs. The man driving them had stopped to let them rest, and they were lying down. I ran over the lot, about a rod wide, keeping in the road. It gave me quite a shaking up, but did no harm to me or my wagon.

My auto is now all right and is giving very good satisfaction.

The History of a Home Made Car.

By FRANK HEITGER

It was about four years back that I first contracted the automobile fever. This is certainly not very long ago expressed in years, but when gauged by the developments in the automobile line it seems far back, as improvements have come more quickly than any of us expected.

I was not able to buy a machine at the then prevailing prices, so decided to build one myself. After a great deal of study and reading on the subject the plan matured in 1901. I had a small but fully equipped machine shop, where I could do most any kind of machine work except foundry work.

As I had built several gasoline engines for marine and stationary use and repaired and handled several different makes, I concluded to use the gasoline engine for my power, and I have never regretted this choice, although I have had some very trying times with this power. I decided that the car should be of the light runabout type, and as it would be something of an experiment with me, I did not want to invest too much in it.

I finally bought a light tubular running gear, a set of castings for a 3½ horse power engine, castings for the transmission, plugs, a coil, six cells of Edison Lande battery, chains, etc., and started to work on them at my odd times.

Finally, during the latter part of the summer, I got the machine assembled so I could test it in the shop. So I filled up the gasoline and water tanks (I used only a 4 gallon tank for water, no coil or pump), charged the batteries, adjusted the spark coil, etc. This was my first experience with the jump spark, and at that time I almost became disgusted with it, owing to bad plugs, but since then I have become a firm believer in the jump spark.

At first I could only get explosions occa-

sionally from the engine, never more than two or three in succession. I made all possible air and gasoline adjustments, vibrator and spark point adjustments, and got four or five different makes of plugs. The first plugs I had were always giving sparks, yet the charge failed to explode. I did not then know that the sparks were not large or hot enough. After getting the other plugs and trying them in different ways I got at last a spark quite different from what I had been getting, and found then that about all the trouble I had had been due to the spark. Finally I got the engine to run first rate in the shop, and decided to take the machine out on the road. I had only run about one block, however, when the chain jumped off. I put it on, tightened it up and started again, but every time I got on a hard pull the chain would either jump off the sprocket or jump the teeth on the small one.

I discovered here that the gear I had was not of proper construction, as every time there was a strong pull on the chain the rear axle springs would give or spring forward, allowing the chain to become very slack, but when the machine was standing the chain would be tight. This gear had tubular reaches of the customary construction of that time, but no radius rods, and the chain adjustment was made by moving the transmission frame. The slackness in the chain was taken out by putting an idler under the slack side under the tension of a coiled spring, so that as the pull came on the chain the spring and idler would take the slack up, and it worked very satisfactorily.

Next thing I found my low gear was too high for the hills around here, so I put on a smaller sprocket, giving the car a speed range from 5 to 18 miles per hour. The transmission provided for two forward speeds only, which were both operated by one lever mounted on a tubular column at the right side of the seat. On top of this column was a small knob on a rod running down through the column to the spark shifter, which made the car very handy to control.

My transmission was of the type using a clutch for each change of gear and driven with chains. I found it very easy running. I could mount any grade around here on the low gear with two people, and we have some very heavy and long grades here, from 5 to 35 per cent., and some three-fourths of a mile in length, and it is up and down hill all the time for miles. A party from Chicago, who came through here with a heavy touring car last summer, said he ran up against some very stiff hills and had to get out and push several times while his wife steered the machine. I did not take any long trips in my machine, being content to run it around home, as, it being my first attempt in this line, I did not desire to take too great chances with it.

After I got some of the defects out of the car it ran very well as long as the

spark was all right, but this part always gave me the greatest portion of my trouble. One great trouble I had when running was scaring horses; they would scare at it even when it was standing stock still, although it made very little noise when running—not half as much as some of the horse drawn vehicles. I would often have to stop as much as four or five times in running a mile to let scary horses get by.

Late in the fall I took a photographer out into the country about one mile to a suitable place to take a photo of the machine with a nice background. It was not as heavy a machine as I wanted, so I desired to sell it, and wanted some photos to send out. We got a photo and started on the trip back. About three-quarters of the way back is up grade, from 10 to 25 per cent., which makes it a very good testing ground for a machine. But I had no trouble and have frequently ascended this grade in this machine, and also in the heavier one I now have.

Just outside the city there is a bridge over a railroad which has a heavy railing on each side about 24 inches high. Just before getting to this bridge I noticed a man on horseback coming toward us on the opposite side. I was always on the lookout for horses, and always tried to avoid trouble, so I slowed down to about six miles per hour to pass him. We passed on this bridge, just as the horse came abreast of us. The rider of the horse was drunk, and leaning at the auto he lost his balance and came near falling off the horse. To save himself he gave the bridle a strong pull, backing the horse right against the near front wheel, which jerked the steering lever from my hands, and the machine swerved into the bridge rail, locking under the rail so tight that two of us could scarcely pull it out. The one wheel went under with force enough to flatten the rim when it struck, but did not hurt the tire.

I gave the horseman a little piece of my mind, which was about all I could do, as he was bigger than I and drunk and in no shape to reason with. It was his fault entirely, as the horse was not scared in the least. I proceeded to examine the machine as to damage, and found one steering knuckle and axle bent, one reach tube bent and the other badly bent and cracked, the spring hanger sprung, also some of the steering apparatus out of shape, but I managed to creep ahead to the city.

I have often wondered what would have been the outcome if I had damaged the other party by my carelessness to the same extent that he had damaged me. Of course, I repaired the machine myself, but if I had had it done it would have cost me \$40 or \$50.

I ran this machine until winter, enjoying many rides in it, and gaining much experience from building and running it. It gave me very little trouble outside of the



THE OBSTACLE CONTEST—MOVABLE OBSTACLES.

sparkling. With the second machine I built I have had very little trouble from this source, as I profited by the experience gained with the first car.

In running this machine I found that the life of tires depends about as much on the rider as anything else—the condition in which he keeps the wheels, where he runs and how he runs. The life of tires can be lengthened a great deal by a little care, which costs nothing.

I found this machine was too light for general use in Indiana, of too short wheel base and not flexible enough. I have since built another larger and stronger machine which I have been using with satisfaction.

The Ostende Automobile Week.

The series of automobile events and festivities at Ostende, the Belgian coast resort, began on Saturday, July 11, with a 10 kilometre race with standing start. The course of the race lay on the new road presented by the King of the Belgians, between Nieuport and Snaeskerke. The event was well organized and proved a success in every respect. The world's record for 10 kilometres, which until then was held by Baras, was broken by a number of the competitors. The best time was made by

Gabriel in a 70 horse power Mors machine, entered by and belonging to Amblard, doing the 10 kilometres in 5m. 12s. Gabriel was disqualified, however, as Amblard had named himself as driver of the vehicle and had not informed the race committee of the change in drivers. First place in the official classing was therefore accorded to Willy Poege, who drove a 60 horse power Mercedes car and made a time of 5m. 13.3-5s. Second place was secured by Salieron (70 horse power Mors) in 5m. 16.4-5s.

On Monday, July 13, there was a 5 kilometre race for tourists' vehicles, which also started at Nieuport. The entries in this race were classed according to the price of the chassis; there were in all six classes, the respective limits of price of chassis being \$800, \$1,200, \$2,000, \$3,000, \$3,200, \$3,400. The best time was made by Willy Poege (Mercedes), who covered the 5 kilometres in 2m. 50s., corresponding to a speed of about 66 miles per hour. The vehicle started from a standstill and carried four people. This is the same vehicle with which Poege competed in the racing section two days earlier, but the bodies had been changed. There were no less than twenty-nine starters in this event.

On Tuesday, July 14, an obstacle contest

was held on the Hippodrome Wellington, which proved very amusing to the attendance. At first the contestants were required to pass between numerous posts stuck into the ground irregularly; then they were required to pass over an earth wall, stopping at the summit; next movable barriers were encountered, and then the contestants passed under a ring which they were required to grasp hold of, etc. In the classing in this event a maximum of 100 points was given and ten points added to the record of the contestant making the best time. There were no less than sixty starters in this event, which was won by Pierre de Crawhez with an 8 horse power Panhard vehicle in 4m. 45s. The event came to an end only at 5:30 in the afternoon, and was followed by a magnificent battle of flowers on the North Dike.

On Wednesday, July 15, King Leopold offered a reception to the different automobile clubs represented, and in the afternoon a mile record race took place on the new road near Snaeskerke. The times made in this race were far from the records, however, the best time being made by Rigolly with a 100 horse power Gobron-Brillie, viz., 58.4-5s.

A tour from Ostende to Ypres took place on Thursday, July 16. Twenty-one vehicles started, and fourteen received mention in the official classing, these having made the total distance at an average speed of 30 kilometres per hour.

The week was concluded by a flying kilometre race in which three records were broken. Rigolly, with his 100 horse power Gobron-Brillie, made a time of 26.4-5 seconds. This, of course, is not better than Baron de Forest's time made at the Phoenix Park, Dublin, recently, but that time is not accepted as a record, as the course is down hill. Pillette, on a De Dion tricycle, made a time of 43.2-5 seconds, and Sauvenière, on a Clement bicycle, in the class over 110 pounds, a time of 32.4-5 seconds—both records. Among the competitors in the mile and kilometre races was J. W. Stocks, with a Napier car, who secured eighth place in the general classing.

The Synthetical Production of Liquid Hydrocarbons.

A subject that may in the future become of great importance, but which seems so far to have received but scant attention, either from scientific investigators or the technical press, is the question of commercially producing petroleum and its products directly from the elements of which they are composed.

It is not generally known that there are a number of chemical processes by which it is comparatively easy to produce a wide range of solid, gaseous and liquid hydrocarbons, some of the last of which are substantially identical with petroleum and certain of its distillates—such as kerosene, gasoline, benzine, naphtha, etc. So far, none of these reactions has been suffi-



OBSTACLE CONTEST—THE EARTH WALL.

ciently simplified or cheapened to permit of a commercial application, but, as the laboratory process of today is often the commercial development of tomorrow, we feel that they are not devoid of interest.

Most of the processes to which we refer depend in some manner upon the reaction of water on the metallic carbides, one of which reactions—that of water on calcium carbide—is already in commercial use for the production of a high grade hydrocarbon illuminating gas.

Many prominent scientists have held that rock oil, or petroleum, originated from vast beds of organic matter—dead fish, animals, etc.—which in ages past had in some manner become buried under rock and earth and subjected to tremendous pressure and heat. Other scientists, prominent among them the famous Russian chemist Mendeleff and the French savants Henri Moissan and Paul Sabatier, have held to the theory that petroleum is of inorganic origin, having probably been produced by the action of water, or saline solutions, on metallic carbides (perhaps that of iron) in the interior of the earth, under conditions of considerable heat and pressure.

In support of the last hypothesis, Moissan, in 1866, described a series of experiments he had undertaken a short time before. As a result of his investigations he had found that all the metallic carbides were decomposed in the presence of water, with the evolution of acetylene—sometimes alone, oftener in connection with a complex mixture of liquid, solid and other gaseous hydrocarbons.

The carbides of the three alkaline earths—soda, lime and potash—(corresponding to the formula C_2R), that of lithium (C_2Li) and those of aluminum (C_2Al), glucinum, cerium, lanthanum, yttrium, thorium, manganese (C_2Mn) and uranium (C_2U), were the principal ones with which experiments were conducted.

The aluminum carbide was formed by strongly heating the metal in an electric furnace in the presence of carbon. This caused it to become covered with yellow layers of carbide, in the form of transparent hexagonal laminae. This carbide decomposes in contact with water at ordinary temperatures, furnishing alumina and pure methane gas, i. e., $C_2Al + 12 H_2O = 3 CH_4 + 2 (Al(OH)_3)_2$.

Glucinum carbide was found to act in a manner similar to aluminum.

The carbides of cerium, lanthanum, yttrium, and thorium, when decomposed by water, furnished a gaseous mixture rich in acetylene and containing some methane, that of thorium giving more methane and less acetylene than the others. The cerium and lanthanum carbides both gave liquid hydrocarbon in small quantities.

Carbide of manganese, which can be readily produced and is fairly inexpensive, furnishes a mixture of methane and hydrogen, in equal quantities, when acted upon



OSTENDE WEEK—POGE WINNING IN THE FIVE KILOMETRE RACE.

by water. The reaction is as follows: $CMn + 6H_2O = 3Mn(OH)_2 + CH_4 + H_2$.

The most interesting results obtained by Moissan were those from carbide of uranium; this carbide, when decomposed, giving a complex mixture of methane, ethylene (olefant gas), and hydrogen, also containing liquid and even solid hydrocarbons.

In one experiment, starting with 8.80 pounds (4 kilograms) of carbide of uranium, .22 pound (100 grams) of liquid hydrocarbons was obtained. This liquid was found to consist largely of products of the ethylene group—non-saturated, and to a small extent of acetylene hydrocarbons. These were produced in the presence of a large excess of methane and hydrogen, and at ordinary temperature and pressure, which led Moissan to the belief that if the decomposition took place at high temperatures, saturated hydrocarbons similar to those of the petroleum series might result. For it had been shown by Berthelot that hydrogen could be combined chemically

with a non-saturated hydrocarbon by the simple action of heat.

In 1900 Paul Sabatier made further experiments along lines slightly different from those suggested by Moissan.

During his experiments Sabatier found that it was possible regularly to hydrogenize acetylene by means of finely divided metals, such as iron, copper, cobalt and particularly nickel.

The first method used was that of directing a mixture of acetylene with an excess of hydrogen upon nickel, newly reduced from its oxide. It was then observed, both at ordinary and at higher temperatures, that the two gases combined with the generation of heat. The action proved continuous, occurring indefinitely without modification of the metal. The chief product was the gas ethane (C_2H_6), but it was accompanied by a considerable production of formic hydrocarbons, both gaseous and liquid. The latter, condensed, formed a nearly colorless liquid, evaporating almost completely below 20° Fahr., and having an odor the same as that of



OSTENDE WEEK—START OF THE TOURISTS FROM THE PALACE HOTEL AT OSTENDE. Google

gasoline. If, in order to avoid condensation of the liquid on the posterior portion of the nickel, it was heated (throughout) to 320° Fahr., the resulting liquid was yellow, with a bluish fluorescence, with the gasoline odor still persisting.

With a proportion of hydrogen less than double that of the acetylene, the gaseous and liquid hydrocarbons contained, besides the foregoing, a greater or smaller proportion of ethylenic and even "cyclic" hydrocarbons, the composition becoming similar to that of certain petroleum, notably those from Galicia.

By increasing the proportion of acetylene the products tended to run more into the aromatic series of hydrocarbons—including benzene and other "coal tar products." At the same time the metal carbonizes slowly, and we arrive at the phenomenon of local destruction of the acetylene, with incandescence and carbonaceous "toisonnement"—a separation of part of the acetylene into its elements (carbon and hydrogen) accompanied by condensation of another portion of it in combinations identical with benzene and similar but still more volatile liquids. The rest is regularly hydrogenized.

Another method employed was that of directing a strong blast of acetylene on a column of nickel, maintained at a temperature of 320° Fahr. The column at once became heated to incandescence at the expense of a part of the gas. This incandescence travels slowly in the direction in which the acetylene blast is directed. The hydrogen thus liberated combines with the uncombined acetylene that still reaches the nickel, forming a liquid hydrocarbon of green fluorescence, and partly aromatic, partly ethylenic, and partly formic.

Above 294° Fahr. the action of iron was essentially the same as that of nickel, except that it was found to carbonize more rapidly, even with an excess of hydrogen, thus limiting the duration of the process. The product was a yellowish liquid of penetrating odor, indistinguishable from American crude oil.

It must be apparent from the foregoing that the synthesis of the petroleum has been actually accomplished. The difficulty so far has been that the acetylene has cost more than the liquids produced were worth. Should a market appear for the by-products of these processes; there would be more immediate hope of placing them on a commercial basis. However, this is a comparison based merely on prevailing prices. Should petroleum rise in price and the expense of these synthetic methods be reduced, there may yet appear a field for the commercially profitable synthesis of gasoline, at least. Certain it is that the natural product seems limited, and consequently should progressively increase in cost, while of the chemical method there is this to be said—that, whatever it is at any given period, its tendency must always be to improve from the standpoint of the practical.

COMMUNICATIONS.

Tourist Not Held Under Bailey Law.

Editor HORSELESS AGE:

I have just completed a trip from New-wood, Mass., to New York city and back, 652 miles, in four days' time. I used a chainless steam runabout and was accompanied by my wife. The first night we stopped at Springfield, and the next day ran the 166 miles to New York. On the return journey we stopped at Wallingford, Conn., where we were overtaken by a shower, and the next day we reached home. We never started earlier than 8:30 a. m., and always finished our day's ride by 6 p. m. We took a lot of photographs en route. Among the many incidents of the trip one struck me as very funny. While running from New York to Yonkers nearly every child of whatever age kept up the continual cry: "Git a horse. Git a horse." On my return from a short run I asked the people at the auto station for the reason for this practice and was informed that so many autos broke down and were brought in by a horse that it had become the watchword there.

I was stopped a number of times in New York State for not complying with the Bailey law. I told the police that I was just passing through the State—not a resident—and it worked.

A. T. HARRIOTT.

Touring in Maine and New Hampshire.

Editor HORSELESS AGE:

Referring to my letter to you, commenting on the newspaper article about "lumber roads and half-blazed trails," which the Orange, N. J., party would take to Rangeley Lake, I will say that I have returned from the proposed trip over the same roads to be taken by this party—I, e., the part through New Hampshire and Maine where the roads are supposed to be so rough, and both machines, the Winton touring car and White Stanhope, went through wholly under their own power, and without any breakdown or trouble with either machine, except that a tire on the White (which had been in use all last season) burst, and we had one leaky tube in a Winton tire. The latter would not have happened had not a farmer attempted to hold us up by throwing the tongue of a mowing machine across the road, simply to see us stop. I could not stand the temptation to punish him, so ran over it and broke it—also caused a tube to leak.

The roads in the mountainous part are hilly, and the hills are long and steep, but the roadbed in such places is generally good and hard, and any good automobile will

make the trip. Progress is necessarily slow, and it was especially so with us, as it rained almost every day while we were on the trip, and we stopped for nothing. I noticed in one article that the Orange party had sent gasoline ahead, so that they would not have to depend on the "watered" kind locally handled. We bought gasoline all along the route, and had no trouble whatever in using it in the Winton, therefore it could not possibly bother a steam machine. We took the shortest roads in every case, regardless of whether they were roughest or not, and while some of the hills are very long and very steep, we went over all of them without trouble or accident. Our route was via Lewiston, Mechanics Falls, Naples, Bridgeton and Fryeburg, Me., and Conway, Crawford Notch, Whitefield, Lancaster, North Stratford, Dixville Notch, N. H.; then via Upton, Andover, Rumford Falls, Dixfield, Canton and Auburn, Me., to Brunswick. H. C. BAKTER.

Double Piston Engines.

Editor HORSELESS AGE:

I read with interest your notice regarding the Binete motor in your last issue, and note that you state that there are but two builders of this type of engine.

Regarding this point, would say that W. E. Carey, of Springfield, Vt., has built, in a small way for the last three years, engines working on this principle, although his design is somewhat simpler than that of the Binete. He simply offsets his piston rods, thus having but two cranks. He also employs a rotary valve, which has proved in practice, with him at least, to have some very desirable advantages. One of these motors has been running a small shop for the last three years, and I firmly believe that it is destined to be heard from, as this construction not only reduces the vibration to a minimum but the great expansion of the charge between the two pistons makes the exhaust scarcely objectionable without a muffler. W. D. WOOLSON.

[We do not see why there should be any more expansion in a double piston engine than in a single piston engine, as the double piston engine draws the whole cylinder volume full of charge and after compression and ignition expands the gases again to the same volume, exactly the same as a single piston engine.—Ed.]

A Crank Case Explosion.

Editor HORSELESS AGE:

In my ignorance I supposed the newspaper stories about gasoline machines blowing up to be "yellow paper" talk, but now that I have had the experience I shall not be so hard to convince in the future. My machine is a popular car with a two cylinder opposed motor, 15 horse power, 1902 model. The amount of mixture fed to the cylinder is controlled by the air pressure on two small pistons near the carburetors. The air is pumped by a small

pump alongside of one of the cylinders. From this pump a connecting rod runs to the head of the opposite piston, where it is screwed in and riveted over. The cranks work in an airtight case. The air pump connecting rod came out of its fastening in the head of the piston, leaving a small hole through which the gas rushed when the piston moved up to compression, and through which the fire passed when the spark occurred. Result: The crank case blew up, the upper half being blown off, taking with it the footboard, seat board and cushions and springing the bottom of the crank case enough to break off the cast-iron pipe that runs from the bottom of the cylinder water jacket to the pump. Of course, no amount of gas could get into the crank case that would do much more harm than the above. However, it is interesting to learn of a new way in which a gasoline machine can "blow up." M.

Apops of the Licensed Association of Automobile Manufacturers.

DETROIT, Mich., July 28.

Editor HORSELESS AGE:

I send you herewith advertisements that appeared on successive days in Detroit papers.

A few months ago the Association of Licensed Automobile Manufacturers notified a number of firms here that they must stop infringing the Selden patent.

The local concerns having examined into the matter concluded that the association had no right to interfere with their business and notified the association accordingly.

Now, if this Association of Licensed Automobile Manufacturers thought they had any rights, it was then the proper time to assert them. But no action has been taken until the appearance of this advertisement.

A corporation limits the financial responsibility of its members; surely an association does not limit the moral responsibility of its members, or relieve them of the obligation of common honesty, good faith and fair competition in business.

It is a dangerous power this so called Association of Licensed Automobile Manufacturers wishes to assume.

The art of motor carriage building is not half developed. Many believe that combines and trusts mean nepotism and incapacity in the engineering departments, and insincerity and oppression in business dealings.

See editorial, "Trusts and Patents," *American Machinist*, April 16, 1903.

E. J. STODDARD.

Mr. Edge Explains.

Editor of HORSELESS AGE:

Re my tires in the Gordon Bennett Race. There have been an enormous number of wild statements in reference to this matter, but I think it will be as well that the matter should be put perfectly correct once and for all.

First—I had no punctures.

Secondly—My tires were never torn to pieces or destroyed in any way. The whole trouble was that the heads of the 90 millimetre tires are not strong enough or large enough to stand the stress of a car running at 80 miles an hour, or to convey the engine power necessary to gain this speed, the result being that the covers simply come off.

The actual tires which came off are still quite suitable to use on a touring car, or even on racing cars up to 65 miles per hour, but not higher speeds.

The tires did not fail because of their particular size. It was purely a case of the holding on portion of the tire not being strong enough for its work, and unfortunately no amount of practice either in England or Ireland prior to the race would have found this out, as it was not until very high speeds were reached that the troubles occurred, and this speed would not have been reached in practice on roads which were not kept for racing.

When I won the Gordon Bennett Cup last year I used the identical type of tires, but my last year's car was not capable of developing the speed which my present one attains.

Naturally this is exceedingly annoying to everyone concerned and it is an expensive lesson to learn. S. F. EDGE.

Car Wrecked by a Train.

BIRMINGHAM, Ala., July 31.

Editor HORSELESS AGE:

I enclose a newspaper clipping which is an incorrect report of the wrecking of my automobile last Sunday evening. In attempting to cross the railroad track, which runs at an angle of about 45 degrees to the dirt road, with the rails up nearly their full size above the crossing, two wheels (one front and one rear) passed over the rails, while the other front wheel started to follow the rail, and I stopped the car by applying the brake (leaving the engine running). I got out and tried to lift the wheel over the rail, but could not. We then saw the train coming, and my wife and five children got out, and each taking a wheel tried to lift it over the rail, but could not move it, as one front and one rear wheel were against the rail, which was 4½ inches above the dirt road. Seeing that we could not move off the track in time, I took my handkerchief and waved it to the engineer. He then blew the whistle and continued to toot it for some time, but never shut off steam or applied the brakes until after he passed the crossing. He stopped his train about 400 feet from the crossing. The automobile was thrown about 40 feet and landed bottom side up, and is completely demolished. The automobile had not been out of the shop thirty days and was a 16 horse power gasoline car of my own make, weighing about 2,000 pounds. J. C. TURNER.

Accidents and Their Remedy

Editor HORSELESS AGE:

Your remarks on fatal accidents hit the nail on the head. In connection therewith I would like to call attention to the fact that since it is the car and not the runabout that causes the trouble, the heavier vehicle and not the light one should be discriminated against in any proper legislation. In other words, the little vehicle being more harmless should not be so strongly restricted, and such things as identification numbers, lamps and the like should be applied to the large, high speed, heavy monsters, leaving the little, light weight affairs in the same class as other vehicles. It is probably impossible to prevent automobile legislation or to secure even just legislation, but a legislation based upon the degree of probable destructiveness is certainly more reasonable than classing all alike, the good and the bad, and imposing penalties on all.

CHARLES E. DURYEA.

[We believe there should be no discrimination against any class of vehicles in legislation relating to identification numbers, lamps and other means affecting the safety of travel. Fatal accidents can hardly be prevented by legislation, for if the driver will court the risks which running at 35 or 40 miles per hour involves the threat of arrest will be no deterrent for him.—Ed.]

The Whitman Cross-Continental Tour.

OGDEN, Utah, July 28.

Editor HORSELESS AGE:

We arrived here July 26 and shall proceed at once, having stayed here two days to clean up and rest. The only thing fit to use in crossing from here to Reno is a flying machine. It was like getting home, to see green grass and trees again. The streams of water made us laugh and the awful desolation of the deserts was as a dream, but one we will never forget. How we guarded the water canteen and saved the old dried lunches in case of emergency! We are getting along very well and are one day ahead of your expected time to Ogden. We made two miles the last day out of the alkali shores of Salt Lake. L. L. WHITMAN.

Fines by Horse Power.

The Cheltenham and Gloucester (England) Automobile Club want a law passed imposing fines for reckless speeding in proportion to the horse power of the car. Do they expect the police stations to add a Prony brake to their equipment?

When social engagements to "motor down" are made the wise man does not cut the time too fine. For luncheon parties a spare half hour should be allowed for a possible puncture or a "fly" in the machinery.—*The Tattler*.

NEW VEHICLES AND PARTS.

The White Steam Touring Car.

Although the power system in the 1903 White car is fundamentally the same as in the 1902 car, important changes have been made in some details and in the general arrangement of the component parts of the mechanism, and improvements have been added, particularly in the pump system—that vital part of any steam car. There was considerable surprise, and even regret, last winter when it was announced that the White Company had decided to discontinue the manufacture of its runabouts and henceforth confine itself to touring cars. The company correctly estimated the great demand for touring cars which was to characterize this season and decided to build 800 cars of the touring model, 500 of which, we are informed, are already in the

hands of customers. In the present article it is proposed to describe particularly the novel features of the touring car, by the aid of a number of half tones and line cuts.

The running gear is reachless and the frame is supported by semi-elliptic springs in front and rear. The wheel base is 80 inches and the tread standard. Thirty inch artillery wheels are used, shod with 4 inch Goodrich clincher tires. As compared with most other steam cars the White has the distinctive feature that all the parts of the mechanism are supported by the running gear frame and are independent of the body.

The front axle is tubular and is constructed with Elliott steering pivots. The rear axle is a live axle and is now enclosed in sleeves which support the casing of the driving gear and differential. The differential, by the way, is of the spur pinion type. All bearings are ball bearings.

THE GENERATING SYSTEM.

The generator, or semi-flash boiler, is essentially the same as formerly, comprising twelve superposed spiral coils, through

sideways beneath the seat and end in two slightly flattened, rather inconspicuous discharge tubes running fore and aft beneath the overhanging seats of the body. In the transversely extending flues, or draft pipes, are located automatic wind blinds, to prevent back draft.

THE ENGINE.

The engine is compounded and is located in front under the bonnet, in a vertical position, the two cylinders being arranged in a fore and aft plane. The high pressure cylinder has a bore of 3 inches, the low pressure cylinder a bore of 5 inches, and both a common stroke of 4 inches. The two cylinders and the valve chamber between them are made in a single casting. The latter is provided with a head casting on top, and is bolted with its lower end to an intermediate casting, which in turn is secured to the crank casting. The crank casing is an aluminum casting, and is made in two parts, joined in horizontal plane through the centre of the crank shaft. The object of the intermediate casting is twofold. In the first place, it gives access to the stuffing boxes; besides it removes the crank chamber from the cylinders, and thereby prevents all possibility of steam getting into the crank chamber.

The valves are of the D slide valve type, and operated in the usual manner by means of eccentrics and the Stevenson link motion for reversing the direction of rotation. Provisions have also been made to enable live steam to be admitted to both cylinders, and this is accomplished by means of a novel arrangement comprising three poppet valves and a rock shaft on top of the cylinders.

When it is desired to produce an extra amount of power, as might be necessary, for instance, on very steep grades or in exceedingly difficult places, live steam is admitted to both cylinders and the engine operated as a simple engine. To make the change from compound to simple engine requires essentially three different operations, as follows: (1) The high pressure cylinder exhaust must be cut off from the low pressure cylinder admission; (2) the high pressure cylinder exhaust must be placed in communication with the exhaust pipe, and (3) the low pressure cylinder admission must be placed in communication with the live steam pipe. Each of these operations is performed by means of a separate poppet valve actuated by means of levers on the rock shaft, and it will be seen that to change from compound to simple operation requires the opening of two valves and closing of the third. The rock shaft is normally held in the position corresponding to compound operation by means of a long coil spring anchored to one of the supporting arms of the engine. The valve placing the exhaust of the high pressure cylinder in communication with the valve chest of the low pressure cylinder is then open, while the other two valves are closed. The rock shaft is con-



FIG. 1.—THE WHITE TOURING CAR.

which the water is forced in a downward direction. It is placed under the front seat of the car and is heavily lagged with asbestos. The burner also retains its characteristic features—circular concentric ridges in the burner plate with radial flame slits through the top of the ridges and air tubes between the ridges. The live steam pipe passes down through the centre of the burner and forward to the throttle valve, which is located at the side of the engine crank case, under the bonnet in front. The thermostatic fuel regulator is placed in the main steam pipe before it passes through the burner.

THE FRAME.

The frame of the White touring car is of composite construction—hickory wood frame beams with steel flitch plates and channel steel cross braces. The flitch plates lie on the inner side of the longitudinal frame beams and have their ends bent and fastened to the end cross beams to form angle braces. In addition to the end cross beams there are three intermediate cross braces of channel form, two in front and rear of the boiler respectively, and supporting the latter, and one below the dash. The spring horns are hollow castings and are bolted to the wood beams of the frame. The engine and steering gear are supported on longitudinal frame members which fasten to the cross members.

The gasoline tank is made of a seamless steel shell and has a capacity of 10 gallons. It is placed below the footboard, as shown in the accompanying plan view of the chassis. The water tank is located in front of the dash and holds 15 gallons. The range on one charge of supplies, both gasoline and water, is stated to be 100 miles.

The smoke flues of the boiler extend

ected to a foot lever convenient to the operator, by means of a system of links and levers. The change from compound to simple operation is made by simply depressing this foot lever.

The crank shaft is of rather unusual construction. The crank for the low pressure cylinder has only one arm, while the crank for the high pressure cylinder has two arms. The crank arms are provided with balance weights to minimize vibration. Between the two cranks the shaft carries two ball bearings and five eccentrics—four for the valve motion and one for operating the boiler feed and condenser pumps. The rear end of the shaft has a double ball bearing supported in the crank casing and to the end of the shaft projecting from the crank casing is keyed a brake drum forming also part of a universal joint for the transmission shaft.

The crank pin bearings are ball bearings, while the crosshead pin bearings are plain. The crossheads are of cylindrical form and operate in cylindrical guides machined in the upper part of the crank chamber casting. The crosshead pin on the low pressure side is made to extend through a slot in the crosshead guide and operates an air pump when the latter is thrown in engagement with it. The pistons are made very light and have only a single packing ring. The piston rods pass through stuffing boxes in the lower cylinder heads and are screwed into the crossheads.

THE THROTTLE VALVE.

The live steam is led from the bottom coil of the generator through a heavily lagged main steam pipe below the footboard of the car to the throttle valve at the side of the engine. The throttle valve is bolted to the same longitudinal channel steel bar by which the engine is supported, and is operated by a small hand wheel just above the steering hand wheel. An illustration of the throttle, which is of the conical seat

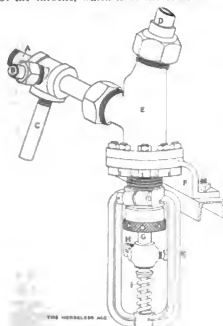


FIG. 2.—THE THROTTLE VALVE.

register type, is shown in Fig. 2. In this sketch A is the live steam pipe from the generator; B the steam connection to the automatic feed water regulator; C the blowoff pipe, and D the steam pipe leading from the throttle to the valve chest of the engine. E is the throttle valve body to which is bolted a combined head and supporting bracket F. The stem G of the valve passes through a stuffing box in the head F and has fastened to it by a set screw the operating arm H. When the system is under pressure and the valve is closed the steam pressure holds it down to its seat, but to keep it in position on the seat when there is no pressure in the system or when the valve is open a spring I is provided and a yoke K secured to a threaded boss on the head F. The yoke permits of adjusting the spring pressure if that should become necessary. The throttle becomes leaky in time, when the connections should be broken, the valve removed and ground in its seat until tight.

THE AUTOMATIC WATER REGULATOR.

The water feed on the car is automatically regulated by a diaphragm device. As long as the generator pressure is below the point to which this regulator is adjusted all the water pumped by the feed pump passes into the generator; when the pressure exceeds this point the automatic device opens a valve and the water pumped is bypassed back into the tank. The automatic regulator is shown in section in Fig. 3. A is the connection to the generator; B the copper diaphragm; C the connection to the steam gauge; D the diaphragm pad; F is a push rod screwed into the diaphragm pad D and secured by a lock nut O. The free end of this push rod is provided with flats and passes through the spring block J and rests against the lever arm N. The spring block J can be adjusted by means of the nut I and the worm H. The lever arm N bears against the poppet valve M, which constitute the bypass valve. E E are plugs which, when removed, give

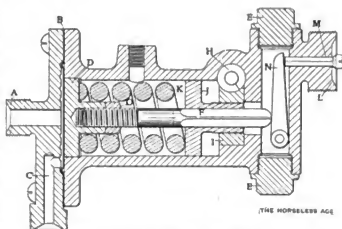


FIG. 3.—AUTOMATIC FEED REGULATOR.

access to the mechanism by which the valve is opened.

When the steam pressure rises sufficiently to overcome the pressure of the spring K, the pad D is forced back by the diaphragm and the valve M is opened. The water then flows from the pump barrel through the valve M and the spaces left by the flats around the push rod F, out the bypass connection H back to the tank.

The regulator is adjusted to operate between 300 and 325 pounds of steam.

THE PUMPS.

The following pumps are provided on this car: A hand air pump and a hand water pump extending up in front of the seat, centrally; an engine driven feed pump; an engine driven pump for returning condenser water to tank (condenser pump), and an air pump driven off the low pressure crosshead when needed. The engine feed pump and condenser pump are built together and are shown, together with the automatic feed water regulator, in Fig. 4, in their correct relation to the engine crank case, the latter being dotted in.

Referring to this figure, the two pump

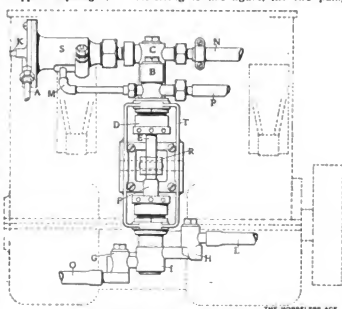


FIG. 4.—FEED AND CONDENSER PUMPS.

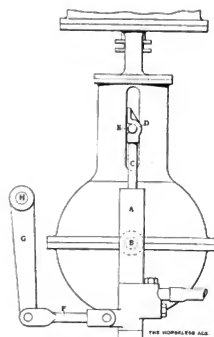


FIG. 5.—POWER AIR PUMP.

barrels are built vertically in line with each other, the feed pump above and the condenser pump below. The feed water arrives from the tank through the pipe or hose P, passes through the suction valve B, pump barrel D, discharge valve C and pipe N to the boiler. That is to say, this is the course the water normally takes when the automatic feed water regulator S is not acting and the bypass is closed. When the boiler pressure rises above the point to which the automatic regulator is set, the latter will open the bypass valve and the water will then be pumped back into the tank through the bypass passage M.

The feed pump plunger E and the condenser pump plunger F are in one piece, although the latter is of larger diameter, and to their middle portion is connected the operating lever R, which is driven by means of an eccentric and eccentric rod off the crank shaft. The water from the condenser arrives through the hose O, flows past the suction valve E and through the pump barrel I, and is then forced past the

discharge valve H and through the hose L to the separator.

The supporting frame T of the pumps is bolted to the crank casing of the engine.

The arrangement of the engine operated air pump is shown in Fig. 5. It has been the practice heretofore to have the pump plunger of the air pump, as well as of the feed pump, permanently connected to the crosshead. However, only very little air needs to be pumped, on the whole, except in the rather unlikely case of leakage in the system, and wear of the pump and power can be saved by providing a sort of clutch by which the pump can be thrown in and out of action when desired. In the White touring car the air pump is supported pivotally on the forward end of the crank case, at B, Fig. 5. In this Fig. A is the pump barrel and C the pump plunger, which at its upper end has fastened to it a sort of hook D which will engage with the pin E (extension of the crosshead pin) when the pump is swung around its pivot support. The lower end of the pump is connected by a link F to a lever arm G on a shaft H. The latter runs back parallel with the crank shaft of the engine and is actuated by a foot plunger rising from the footboard. The foot must be kept on the plunger as long as it is desired to continue the pump in operation, when a spring automatically disengages it. The air pressure in the fuel tank is maintained at from 35 to 40 pounds per square inch.

CONDENSING AND SEPARATING SYSTEM.

The exhaust steam from the engine passes direct into the condenser located in front of the car. The condenser is formed of several vertical rows of flanged tubes opening into headers at both sides. The condensed water drops to the bottom of the condenser and is pumped, by means of the condenser pump, into the oil separator, Fig. 6. The latter consists of an upright cylindrical vessel located just in front of the water tank on the left of the car. This separating well contains a screen at the bottom, upon which is placed waste for filtering the water and depriving it of the oil it holds in suspension. The waste requires renewal about every 100 miles. The separating well is provided

with a cap, and the joint between the cap and body of the well is packed with a gasket, to prevent waste of water. Some oil will inevitably find its way into the water tank, and it is recommended that when an accumulation of oil is seen on top of the water in the tank the latter should be cleaned.

In Fig. 6 are shown the main water and steam connections, the former in full black lines and the latter shaded. In this figure, A is the boiler; B the high pressure cylinder of the engine; C the low pressure cylinder; D the throttle valve; E the water tank; F the condenser; G the separator well; H the automatic feed regulator; I the feed pump; K the condenser pump, L the hand feed pump and M a hand valve in the feed pipe.

LUBRICATION.

The parts in the crank chamber are lubricated by splash, and oil is fed to the chamber and into the cylinders by means of power pumps located on the dashboard and driven from the main shaft by means of a belt. The cylinder oil pump also contains a hand pump by which the oil may be forced into the cylinder by hand. The rear axle is encased with the compensating gear and runs in oil. A filling opening is provided near the top of the casing, through which oil is added from time to time. The same oil is used for the compensating gear as for the cylinder. Provisions are also made for effectively lubricating all the minor wearing parts. The universal joints of the driving shaft are provided with hollow pins for grease lubrication. The steering joints and spring bolts are also made hollow for grease lubrication, and a compression grease cup is furnished with the tool outfit for lubricating these joints.

THE BEVEL GEAR DRIVE.

The bevel gear drive is of the usual construction, with universal and sliding joints, and driving gear and differential encased together at the centre of the rear axle. The gear reduction to the rear axle is in the ratio of three to one, which gives a speed of 30 miles per hour for an engine speed of 1,000 revolutions per minute.

The car is provided with two independent brake systems. One of the brakes is a dou-

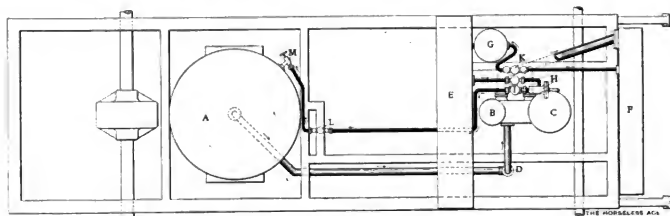


FIG. 6.—DIAGRAM OF WATER AND STEAM CONNECTIONS.

ble acting, external shoe brake and acts on a drum fastened to the engine crank shaft. This brake is operated by a pedal. The other brake is a double rear wheel hub brake and is of the internal expanding ring type; it is operated by means of a hand lever.

The foot brake is very powerful and is the one commonly used for slowing down, while the hand brake is used more particularly for locking the machine in place, as it works on a notched quadrant and can be set.

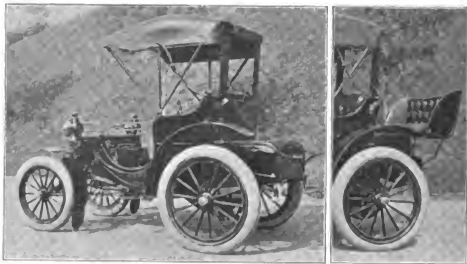
The car is provided with irreversible wheel steering. The body is of aluminum and the tonneau seats are removable. The body is entirely independent of the mechanism, and may therefore be readily removed from the frame with very little trouble. The total weight of the car is 1,650 pounds, and the power equipment is rated at 20 horse power.

The Springer Gasoline Car.

At the shops of John H. Springer, 242 West Forty-first street, New York city, a gasoline machine was recently built after the design of F. T. Clark. The builder proposes to equip his vehicles with either a tonneau, a surrery or a delivery wagon body, using the same design of running gear in all three types.

The motor is located about midway between the axles, the tanks are placed under a hood in front, and the mufflers are secured to the frame at its rear end. The engine has two horizontal opposed cylinders of 4 inches bore and 5 inches stroke, and is rated at 10 horse power. Normally it makes about 900 revolutions per minute. The water jackets extend from the heads to the flanges, instead of only half way between them, as in the majority of automobile motors. Another departure from conventional practice may be found in the circulating pump, which has a plunger to force the water through the system instead of the usual vane. The plunger is actuated by an eccentric, as in launch motors.

Ignition is by means of the secondary system and a belt driven dynamo. No batteries are provided, as the maker does not advocate their use. The variable speed gear is of the planetary pattern and gives two forward speeds and a reverse. The forward speeds are controlled by a single lever. To reverse the car the operator must exert pressure on the pedal provided for this purpose. The motor is controlled by the spark timing lever exclusively, and no means for adjusting the carburetors are provided. A chain drives the differential, which is mounted on two shafts that drive the rear wheels by means of side chains, thus making three chains in all. The shafts that project from the drum of the balance gear are hung from the frame by means of links. Distance rods are employed to take up the slack in the side chains. The rear axle is not moved backward when the radius rods are extended, but the sprocket shafts are swung forward.



DURYEA WITH REAR FOLDING SEAT.

The wheel base of the machine is 78 inches and the tread is standard. The road wheels, of the artillery pattern, are shod with 30x3 inch detachable pneumatics. Both axles are solid steel forgings, and the running gear is reachless. Full elliptic springs are used both in front and in the rear. The frame is of angle steel and has a number of crosspieces of the same stock.

Steering is done by means of a wheel, and a worm and sector gear is fitted to reduce motion. The mufflers are of peculiar construction. Each cylinder has two mufflers, so that there are four in all. The gases escaping from a cylinder pass through two mufflers before they escape into the atmosphere. The water tank holds 12 gallons and the gasoline tank has a capacity of 5 gallons. The radiator has no header castings and comprises a tube bent so as to form eleven rows and the usual radiating disks.

Mr. Springer proposes to build a runabout with a double cylinder air cooled motor. A patent was recently granted the inventor on the construction of the radiating members that will be used in connection with this system.

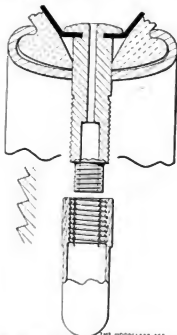
The New Michelin Valve Cap.

To facilitate replacing of the valve cap MM. Michelin, the well known French tire makers, have designed the valve cap shown herewith. The cap is split so that three tongues are formed. Two of the saw cuts are indicated in the drawing, which shows the upper part of the valve cap in section. The threads on the stem of the valve body and inside of the cap are cut as shown so that the cap may be pushed over the valve body. A ring—not shown in the drawing—is slipped over the cap, as soon as it has been thrust into place, to prevent the tongues from spreading.

The cap is removed by sliding the ring off and unscrewing. The ring has no tendency to come off on the road, because the tongues tend to spring out and thus bind it securely.

Duryea Car With Rear Folding Seat.

The Duryea Company have brought out a new design of body, as shown in the accompanying illustration. The design is called a folding rear phaeton. When the rear seat is closed, as shown in the left hand view, the car presents the same appearance as the ordinary phaeton of the company, but when the seat is opened, as shown on the right, a surrery seat is provided, which is claimed to be both comfortable and roomy. The rear seat may be removed, with its framing, leaving a trunk platform for touring purposes. The car weighs 1,100 pounds.



MICHELIN VALVE BODY AND CAP.

During the discussion on the new English motor bill in the House of Lords on July 17 an attempt was made by Lord Camperdown to fix the maximum speed at 20 miles an hour. Lord Herries and Lord Kelvin supported the proposal.

...OUR... FOREIGN EXCHANGES



Some New Features of the Peugeot Cars.

The vehicles of the Société des Automobiles Peugeot belong to the medium weight class of French cars, and are equipped with high speed motors, which run at the rate of 1,500 to 2,000 revolutions per minute. Since these builders have abandoned the jump spark and have adopted the contact spark system of ignition, despite the general belief that the latter system cannot be applied successfully to a high speed motor, special interest should be attached to the make and break mechanism employed.

THE MAKE AND BREAK DEVICE.

In Fig. 1 the ignition device is shown in elevation. The cam A raises the push rod B which compresses the coiled spring C. The latter raises the rocking arm D so that the extension spring E causes the rocker F on the shaft of the movable electrode to press against the collar G, which is screwed onto the upper part of the push rod B. The movable electrode soon makes a contact with the insulated electrode and the spring E is then extended slightly until the push rod has reached the highest point of the cam. The latter is machined so that a sudden drop of the rod B takes place, as soon as the spring C is released and is able to overcome the inertia of the push rod. As long as the electrodes are in touch with each other the rocker F and the collar G are disengaged. When the spring C recoils, however, the collar strikes the rocker a blow and the electrodes suddenly separate. A spark is then formed, because of the break in the circuit.

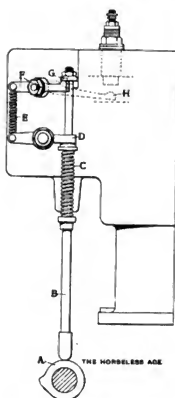


FIG. 1.—PEUGEOT IGNITER.

THE CARBURETOR.

Unlike most foreign carburetors the new Peugeot apparatus is very simple. A float K of sheet copper is located in the chamber J. Through the centre of the float a needle valve L passes, to regulate the level of the gasoline in the float chamber. The fuel flows to the nipple M, through a duct which is drilled into the casting at an angle. Air is drawn in at N, passes through the valve O and then creates a draft in the tube P where the gasoline vapors mix with the air. In the pipe above the spraying chamber is placed a butterfly valve Q, controlled by

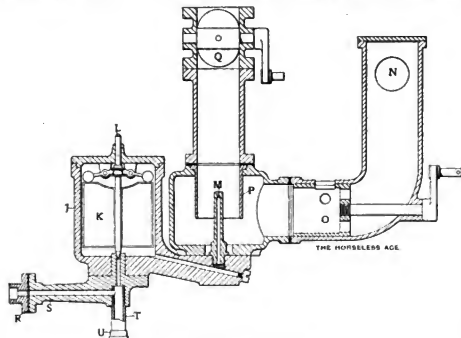


FIG. 2.—PEUGEOT CARBURETOR.

the centrifugal governor. The amount of air admitted to the carburetor may be regulated manually by means of the valve O, which has perforations of various sizes. To keep out foreign matter a strainer of wire gauze is interposed between the fitting R and the casting S, and any sediment that may pass through the strainer settles in the tube T and is removed by unscrewing the cap U.—*La France Automobile*.

Golden Rules for Automobilists.

ON THE ROAD.

In meeting another vehicle take to the right side of the road early, that the other driver may do the same.

In overtaking a vehicle, do not at once pass to the right, but wait until you have gained a lead of at least 100 feet.

In going down hill, give the right of way to an ascending vehicle, and even stop, if that should be necessary.

Do not cut turns short without having first made certain that there is no vehicle approaching from the opposite direction.

Do not pass through villages on the fourth speed; you will not excite the admiration of anyone and run the risk of deserved arrest.

When you find it necessary to stop abruptly, raise your hand to signal drivers who may be following you.

When you leave your vehicle on a down grade, do not forget to block your wheels; your hand brake may slip, and in that case you would be likely to find your machine at the foot of the grade in the ditch.

In mountainous country it is well to carry a drag, to be applied with a handle, in addition to the sprag.

If a repair becomes necessary on the road, proceed slowly and methodically—you will thereby gain in time.

Use the utmost prudence, always and everywhere.

IN THE STATION.

Do not smoke while filling your gasoline tank.

If you use denaturated alcohol, be sure not to spill any on the varnish of the vehicle, or to get any in your eyes—it would be annoying and disagreeable.

Do not take out all the spark plugs when there is nothing the matter except that there is no gasoline in the tank.

Do not forget to purge the motor with kerosene or gasoline just after stopping it.

Do not apply a match or small torch to the carburetor to reheat it, because it sometimes leads to unexpected results.

If you need a small spare part from the manufacturer or parts dealer, have it sent by mail.

Do not grind in the valves any oftener than is absolutely necessary.

If the cone of the friction clutch slips, spread some of the residue found in the acetylene generator over the leather lining.

In case a bearing shows a tendency to heat, throw some flower of brimstone on it.

The Packard Transcontinental Tour.

The following account of the arrival of the car in Denver is sent us by the Packard Company:

The arrival of the Packard transcontinental car from Colorado Springs on the afternoon of July 20 stirred Denver to a more than ordinary interest in automobile affairs. The car had started from the Springs at 10 o'clock in the morning and would have covered the distance, 75 miles, before 3 o'clock but for the reception accorded the travelers en route. When 18 miles from the city they were met by the four gentlemen representing the Packard Motor Car Company's interests in Denver, namely, George Gorton, of Warren, Ohio, who is temporarily in Denver as demonstrator; J. H. Nichols, Jr., O. T. Higgins and George Hering, the local agents, who had with them a representative of the *Denver News*. The Old Pacific, as the car has come to be known after completing the most arduous portion of its unique trip, and Messrs. Fetch and Krarup were cheered to the echo. The car was looked over and its good condition caused remarks of admiration for the skill of the operator in taking it so safely through the rough sections of Nevada, Utah and Colorado. Then the course was continued to Littleton, 8 miles farther, where the Denver Automobile Club had assembled to do honor to the travelers. Cheering was renewed, and all business jealousy between various manufacturers of automobiles seemed to have been set aside for this occasion. The White steam tonneau, four Rambler cars, two Locomobiles and one St. Louis car were represented, the occupants being the best known automobilists of Denver, including the secretary of the Automobile Club, Dr. W. H. Bergtold. Others were E. R. Cumbe, C. V. Davey, E. W. Swanborough, George E. Hannan, Benjamin Campbell, Charles Bilz, George E. Fell, W. F. Frazier, Joseph Mino, Mr. Joslyn and several ladies.

On the way from Littleton to Denver the pace was faster than any indulged in by the overland travelers on previous occasions. Denver motorists being still partial to high speeds, but the mustained vehicle held its place without difficulty. A bouquet was thrown Mr. Fetch by an enthusiastic woman, but it fell by the roadside, and only the shouts of the cavalcade as it rushed by rewarded the pretty donor.

Arrived in Denver, a circuitous route was followed through the principal streets to the Packard agency, giving all the population an opportunity to realize that the most difficult and perilous portion of an unprecedented motor car performance had been successfully finished.

The latest reports from the Packard tourists are as follows: They arrived at North Platte, Neb., on July 27 at 6 p. m., both machine and occupants in first class condition. The third cyclistometer was broken during the day. Kearney, Neb.,



TRANSCONTINENTAL TOURISTS WELCOMED BY DENVER AUTOMOBILE CLUB.

was reached at 5 p. m. on the 28th. The tourists were daubed with flat bottom mud from six duckings. The roads were mostly dry, but were blocked every few miles with alkaline sink holes and ponds. Grand Island, Neb., was reached on the 29th. The start on that day was delayed till noon by continual rain. Many detours were made to avoid miring, and all the roads in the Platte Valley were in abnormal condition. On the 30th the tourists arrived at Fremont, Neb., after some trouble and delays, mostly due to the rain and consequent mud. The motor was submerged in a slough near Clark, which caused a delay of two hours. At Columbus the road was somewhat better. Omaha, Neb., was reached at 11 p. m. on July 31; it rained continually, and the roads were very heavy.

Report on Commercial Vehicle Contest.

An advance copy has been received of the official report on the Commercial Vehicle Contest held last spring by the Automobile Club of America. It contains descriptions of all the competing vehicles, the rules of the contest, the performance of each vehicle, awards and illustrations of the vehicles as they appeared in the contest. The report is apparently gotten up in a very thorough manner and should prove of interest to commercial houses interested in the subject of motor trucking and delivery.

The Buffalo Gasolene Motor Company, of Buffalo, N. Y., against which suit was instituted on July 12, 1900, by the Electric Vehicle Company for infringement of the Selden patent, has just submitted to a formal decree, acknowledging the validity of the patent. Following this action they have been admitted to membership in the A. L. A. M. No other suit is now pending in the courts.

The Fall Reliability Run.

Secretary Unwin, of the National Association of Automobile Manufacturers, has returned to New York after his two weeks' survey of the New York-Cleveland route that is one of those under consideration for the fall reliability contest. He reports that the Cleveland clubmen and tradespeople are enthusiastic over the possibility of their city being made its terminus.

C. H. Martin, who accompanied Mr. Unwin, reports the following concerning the route taken from Owego on:

As far as the bridge at Smithboro the earth road is one that is in good condition in dry weather. A short 15 per cent. grade is encountered near Ellistown. From there to Corning there are fair earth roads, with no bad hills. Between Corning and Geneseo the road was very poor, especially from Cohocton to Mt. Morris, where there are many abrupt ascents and descents of difficult character.

From Geneseo to Buffalo the old post road was taken, and found excellent the whole way. None of the hills on this part of the route were over 6 or 8 per cent.

Good gravel roads, with occasional bad spots, were the rule between Buffalo and Erie. Near the State line is a dangerous double hill, which commences with a right angled turn, followed by a 100 yard descent of 12 per cent. and ended by an up grade of 14 per cent. This hill is much traveled and winds considerably.

A 5 mile stretch of bad sand, near Conneaut, and three short grades—none over 15 per cent.—are the worst of the running between Erie and Cleveland.

It is estimated that, of the total distance of 676½ miles from 146 West Thirty-ninth street, New York city, to the square in Cleveland, there were not over 300 miles where it would be safe to run faster than 15 miles an hour.

Mr. Martin denounces a rural method of

road repairing of which he found frequent evidences, and which consists in dumping scraper loads of loose dirt in slight hollows without tamping or leveling. The result is that people drive around these dirt piles and the road remains worse than before.

A meeting of the technical committee of the N. A. A. M. was to be held August 4, at which recommendations as to the best route for the contest were to be made. The executive committee will act upon these the day after.

New Incorporations.

The De Witt-Allen Auto Company, of New York city, was incorporated July 24. Capital, \$5,000. Directors, H. L. Allen, G. A. Knowles and T. D. De Witt.

The Regas Automobile Company has been incorporated at Rochester, N. Y., with a capital of \$100,000. J. Harry Sager, Thos. B. Dunn and Carroll E. Bowen, all of Rochester, N. Y., are the incorporators.

The T. H. Buckley Manufacturing Company, of Worcester, Mass., has been incorporated with a capital of \$250,000. The concern will manufacture electric lunch wagons and street cars. T. H. Buckley is the principal promoter.

The World's Fair Automobile Transit Company has been incorporated in St. Louis, Mo., with a capital of \$600,000. Thomas J. Hoolan, Charles M. Polk, T. J. Flanagan, Lawrence W. Day, Spence L. Finley, A. L. V. Mueller, James C. Espy, James Axtell, Michael Hurst, Charles Vastine and H. E. Simon are the stockholders.

Trade Literature Received.

Minneapolis Auto Novelty Company.—Circular of the Sioud spark plug saver.

The Loomis Autocar Company, Westfield, Mass.—"Motor Car and Marine Specialties."

Groat Brothers, Orange, Mass.—Catalogue of the Groat steam motor cars (seventh edition).

American Acetylene Stove Company, 504 Masonic Temple, Minneapolis.—Catalogue of acetylene searchlights.

The Induction Coil Company, 9, 10 and 11 Miller Building, Milwaukee, Wis.—Catalogue of induction coils for gasoline engine ignition, etc.

"Another common obstruction we encountered was the rivers and small streams. We generally rode into them full force, and where the water was deep we would float and the revolution of the wheels would act as propellers. We lacked steering gear, however, and in several instances my chauffeur was obliged to swim ashore with a rope which was attached to the machine."—From an interview with Dr. Jackson in the Peckskill *Evening News*.

Club Notes.



GAS BELT A. C.

The dshanded Gas Belt Automobile Club, of Muncie, Ind., has been reorganized.

NORTHAMPTON, MASS.

The matter of forming an automobile club is receiving attention in Northampton, Mass.

DAYTON A. C.

The Dayton Automobile Club, of Dayton, Ohio, was incorporated July 28. The incorporators are C. B. Wolf, W. W. Ensey, A. F. Bowman and others.

LOS ANGELES A. C.

The recently organized Los Angeles Automobile Club, of Los Angeles, Cal., was incorporated July 25, without capital, and with a number of its officials as directors.

A. C. A.

The Automobile Club of America has received its official report concerning the Gordon Bennett race from its representative, Clarence Gray Dinsmore, owner of the winning car.

BUFFALO A. C.

The Buffalo Automobile Club, of Buffalo, N. Y., held a run to Hamburg on July 25. Thirty-five machines covered the distance, but the day's enjoyment was much clouded by dust.

SPRINGFIELD A. C.

The Springfield Automobile Club, of Springfield, Mass., held a meeting July 24, at which B. J. Griffen was elected secretary in place of F. A. Hubbard, resigned. Eighteen new members were received, making 100 in all.

TORONTO A. C.

The Toronto Automobile Club, of Toronto, Ont., held a meeting on July 24, at which custom house regulations and automobile legislation generally were discussed. Copies of the first of a series of local road books were distributed at the meeting.

A. C. OF CALIFORNIA.

The Automobile Club of California will hold a run to and a race meet at Monterey, Cal., August 6 to 12. The run will be by way of Alameda and San José, and thirty-two members have already announced their intention of participating. The races will come off August 10.

SCRANTON A. C.

The Scranton Automobile Club, of Scranton, Pa., held a run on July 24, in which fifteen machines participated. The club has elected the following new officers: C. S. Weston, president; Thomas Sprague, vice president; A. P. Bedford, secretary; M. L. Smith, treasurer; Frank H. Clemens, Harry Jones, E. W. Tolles, Frank R. Stillman, Jr., and Dr. J. L. Peck, directors.

MINOR MENTION



The Woodruff Automobile Company, of Akron, Ohio, is enlarging its factory.

We have received a copy of the first issue of the "Bulletin Trimestriel," published by the Automobile Club du Centre, 24 Rue Notre Dame, Bourges, France.

A public reception, automobile meet and baseball game are planned at Jefferson, Ohio, in honor of E. T. Fetch, the Packard Motor Car Company's transcontinental tourist.

R. T. Van Valkenburg, of Laporte, Ind., has patented an automobile railway, to be laid of cement, and he is seeking capital for an experimental stretch from Toledo to Cleveland.

R. W. Whipple, of Binghamton, N. Y., is preparing to erect a two story automobile repository and machine shop in that city. The Olds, Pierce, Locomobile, Winston and other cars will be handled.

The White Sewing Machine Company, maker of the White steam vehicles, has leased the two story and basement automobile station at 215 and 217 West Forty-eighth street, New York city.

The Michigan Buggy Company, of Kalamazoo, Mich., is said to have completed its first automobile, and proposes immediately to enter upon its manufacture on a large scale. The machine will be named the "Kalamazoo."

Edmund Dwight and wife, New York, have just completed a 650 mile trip from Portland, Me., through the White Mountains to Woodstock, Vt., Manchester and Saratoga Springs and back to New York in a Locomobile steam survey.

During the month of June there were exported from the United States automobiles and parts valued at \$168,273, and during the twelve months ending June, 1903, the exports amounted to \$1,207,065. The corresponding figures for last year were \$131,150 and \$948,528 respectively.

C. F. Splittorf, of New York city, has invented a new switch which he has added to his line of sparking appliances. By use of this device either one of two battery sets may be readily brought into use, or both may be cut out. A removable plug at the base of the switch arm provides an additional means of breaking the circuit, thus locking the machine against meddlers.

Following upon the recent appointment of a receiver for the Shelby Motor Car Company, of Shelby, Ohio, certain creditors of the concern have filed an application asking that it be declared a bankrupt. The principal plaintiffs in the action and the amounts of their claims are the B. F. Goodrich Company, of Akron, Ohio, \$2,111.80; the Strong, Carlisle & Hammond Company, of Cleveland, Ohio, \$1,000.00.

495.51, and the Frausne & Williams Company, of Alliance, Ohio, \$359.95.

The Motor Storage and Manufacturing Company, of Chillicothe, Ohio, proposes to increase its capital stock to \$30,000 in September.

Nordyke & Marmon, of Indianapolis, Ind., have completed a 30 horse power touring car and may possibly engage in its manufacture.

It is said that the General Automobile and Manufacturing Company, of Cleveland, Ohio, is soon to be reorganized with a capital of \$150,000.

The Birmingham Electric and Manufacturing Company, of Birmingham, Ala., is preparing to place an electric automobile on the market.

R. B. Tyre, of R. B. Tyre & Co., of Cape Town, South Africa, is to come to this country in September to secure agencies for several American automobiles.

Dr. W. W. Colby, of New York city, was assaulted in Ware, Mass., on July 29, by an unknown man, whose horse he had frightened with his automobile.

Chas. Kirkpatrick, John McCardle, Wint Washburn and Starr Dunn, of New Richmond, Ind., are said to be discussing the advisability of starting an automobile factory there.

It is reported that the stockholders of the bankrupt Remington Automobile and Motor Company, of Utica, N. Y., are to be called upon for assessments to pay the company's creditors.

A petition for the dissolution of the Conrad Motor Carriage Company, of Buffalo, N. Y., on the ground of insolvency, has resulted in the appointment of a temporary receiver. Nominal assets are stated at \$40,000; liabilities at \$100,000.

The Jones-Corbin Company, of Philadelphia, Pa., makers of the Jones-Corbin car, were attached August 1 for nearly \$10,000 as a foreign corporation. There was talk of consolidation with another company, but on August 3 an assignment was made for the benefit of creditors.

J. C. Brandes informs us that he has made a deal to furnish Duerkopp motor buses for service in Valparaiso (Ind.), and that eight of them will be running in six weeks' time. These are the same make of bus which was recently put in service on the streets of London.

Arthur C. Moses on July 25 ascended to the summit of Mount Washington with a four cylinder 24 horse power Toledo gasoline car, we are informed. The total height above sea level is 6,300 feet, and the rise from Glen House, 4,700 feet, was made in three hours and five minutes total time. With passengers and everything the car weighed 3,400 pounds.

The Olds Motor Works deny the truth of the rumors regarding their plans for next year, published under "Minor Mention" in our July 22 issue. They state that the price of their runabout will be the same next year as this, and that they will

not make a car to sell at \$650 and \$750 without and with tonneau respectively.

Banker Brothers, of Philadelphia, report sales to the following for the two weeks ending August 1: Herman Buckhorn, Walter A. Bailey, Chas. A. Reynolds and W. H. Dougherty, of Philadelphia; Horace J. Beals, of Parkersburg, Pa., and Geo. H. Earle, Jr., of Bryn Mawr, Pa.

The early appearance of a new French weekly automobile journal, *L'Automobile*, is announced. It will be under the management of Gaston Sancier, who has been connected with a number of other French automobile publications in the past, and published by the Société des Librairies-Imprimeries Reunies. The publication offices will be at 7 Rue Saint-Benoit, Paris.

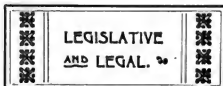
A Proposed Dust Remedy.

Sir Hiram Maxim proposes to down road dust with glue. He writes (in the *Automobile Club Journal*): "Suppose that we employ a fair grade of strong glue and a moderately good kind of molasses or glycerine, we can make a very strong substance which when dried down to a certain extent closely resembles soft rubber. It may be as soft and sticky as a printer's roller, or may be made to any degree of stiffness by increasing the quantity of glue or diminishing the quantity of molasses. Suppose now that we wish to make this mixture insoluble to some extent, we can mix it with a solution of bi-chromate of potash or some similar substance. The solution should then be kept in the dark, and the roads might also be sprinkled at night; the sunlight would then render the mixture difficult to dissolve. If we mix molasses and glue, or glycerine and glue simply, there is a little bacillus which very soon feeds the jelly, and establishes a colony which converts the whole mass into a soft and sticky paste with a very offensive odor."

E. S. of M. M. and T. Memorial.

The English Society of Motor Manufacturers and Traders has presented a memorial to Lord Balfour of Burleigh, which states that the proposed tare and weight limits are insufficient and should be increased, as experience has shown that cars of greater tare weight and traveling fully loaded do no harm to the highways. The memorial also states that the power of arrest conferred is unnecessary and vexatious, that the words "might be expected to be on the highway" are unnecessary and misleading, and that the penalties in the bill, particularly in the case of a first offense, are altogether excessive.

The A. C. G. B. I. has added another class to those provided in the rules for its coming reliability trials. It will comprise motor cycles of over 170 pounds for carrying two persons, such as tandems, quadricycles, etc.



Automobiles are no longer permitted on the principal streets of Bar Harbor, Me.

Complaints about reckless automobile driving have been made to the police department of Long Branch, N. J.

The police of New Haven, Conn., have received orders to arrest all automobilists caught running their machines faster than 12 miles an hour.

Much local opposition has been aroused by the clause permitting a speed of 15 miles an hour in the new automobile ordinance proposed for Milwaukee, Wis.

A police trap for the capture of speeding automobilists has been arranged between the two fire houses in Hammonton, N. J. It consists of heavy ropes and a telephone line.

A. C. Banker has resumed hostilities with the Chicago Police Department. He claims that his latest arrest was contempt of court, in that it violated the injunction he has secured against the city.

Riverside County, Cal., has passed an ordinance making 15 miles an hour the maximum speed for automobiles, and requiring them to take the outside of the grade when passing horses on mountain roads.

W. J. Manger, a New York banker, is defendant in a suit for \$10,000 damages brought by the parents of thirteen year old Charles W. Cease, of Wilkesbarre, Pa. It is claimed that the boy was knocked unconscious by Manger's automobile.

The injunction suit brought by A. C. Banker and others to test the validity of the Chicago numbering ordinance has been finally decided in favor of the city, and orders to arrest drivers of unnumbered machines on sight have been issued.

New York city automobile dealers are indignant over the treatment accorded them by the local authorities in the matter of licensing demonstrating cars. It is claimed that the police have no right to enforce their new rule requiring dealers' cars to be tagged.

Edward Gray, of Boston, Mass., was arrested at Newport, R. I., last week on writs sworn out by J. F. Anthony, of Newport. The latter alleges that his daughter was injured by an automobile belonging to the defendant, and seeks to recover damages.

T. A. Munshaw, of Elgin, Ill., was arrested in Chicago July 31 before he was able to leave town in a new automobile he had just purchased. The charge was operating an automobile without a license or numbers. Local automobilists were also arrested the same day on similar charges.



United States Patents.

734,533. Steam Engine.—Clarence L. Fouts, Eureka, Cal. July 28, 1903. Filed May 29, 1902.

734,588. Wheel.—Conrad Miller, Leadville, Col. July 28, 1903. Filed October 3, 1900.

734,731. Wheel.—Conrad Miller, Leadville, Col. July 28, 1903. Filed October 3, 1900.

734,848. Carburetor for Explosive Engines.—William A. Gill, Portland, Ore. July 28, 1903. Filed April 10, 1902.

734,852. Electric Igniter for Explosive Engines.—George A. Goodson, Providence, R. I. July 28, 1903. Filed March 13, 1903.

734,864. Muffler.—James G. Heaslet, Philadelphia, Pa. July 28, 1903. Filed July 7, 1902.

734,868. Exhaust Muffler.—Christian C. Hill, Chicago, Ill. July 28, 1903. Filed July 28, 1902.

734,878. Muffler.—Thomas H. Jamison, Clayville, Pa. July 28, 1903. Filed August 30, 1902.

734,893. Cone Clutch.—Arthur C. Krebs, Paris, France. July 28, 1903. Filed January 30, 1902.

734,912. Pneumatic Tire.—Arthur H. Marks, Akron, Ohio. July 28, 1903. Filed September 9, 1902.

734,913. Pneumatic Tire.—Arthur H. Marks, Akron, Ohio. July 28, 1903. Filed September 9, 1902.

734,914. Pneumatic Tire.—Arthur H. Marks, Akron, Ohio. July 28, 1903. Filed March 31, 1902.

734,915. Pneumatic Tire.—Arthur H. Marks, Akron, Ohio. July 28, 1903. Filed April 2, 1902.

734,916. Pneumatic Tire and Rim.—Arthur H. Marks, Akron, Ohio. July 28, 1903. Filed May 2, 1902.

734,921. Driving Mechanism for Transmitting Variable Speeds.—Wm. Meischke-Smith and Georgius F. Meischke-Smith, Paris, France. July 28, 1903. Filed December 1, 1902.

734,955. Electric Ignition Generator.—Benjamin P. Remy, Anderson, Ind. July 28, 1903. Filed July 5, 1902.

735,045. Steam Generator.—George E. Whitney, Boston, Mass. July 28, 1903. Filed November 27, 1899.

733,093. Means for Regulating the Power of Automobiles.—Elihu Thomson, of Swampscott, Mass. July 7, 1903. Filed July 21, 1900.

732,008. Driving Mechanism for Automobiles.—Elihu Thomson, of Swampscott, Mass. July 7, 1903. Filed November 27, 1900.

734,872. Support for Motive Power

Agencies.—H. Lemp, of Lynn, Mass. July 7, 1903. Filed August 9, 1901.

732,842. Secondary Battery.—W. Gardiner, of Chicago, Ill. July 7, 1903. Filed January 23, 1902.

The invention relates to an improvement in secondary batteries, particularly to an accumulator of light weight and high efficiency, embracing elements so constructed and combined as to prevent deterioration of the cells through long continued use or disuse. The object is also to provide an accumulator adapted to be quickly discharged without injury.

733,417. Internal Combustion Engine.—Victor R. Nicholson, Bellevue, Cork, Ireland. July 14, 1903. Filed January 3, 1903.

733,498. Carburetor.—George H. Maurer, Montreal, Canada. July 14, 1903. Filed April 24, 1902.

733,532. Axle Nut.—Samuel R. Bailey, Amesbury, Mass. July 14, 1903. Filed January 8, 1903.

733,533. Axle Nut.—Samuel R. Bailey, Amesbury, Mass. July 14, 1903. Filed January 12, 1903.

733,540. Vehicle Tire.—John T. Carter, Racetrack, Mon. July 14, 1903. Filed June 22, 1896.

733,579. Hydrocarbon Burner.—Joseph Fitton, Buffalo, N. Y. July 14, 1903. Filed April 1, 1903.

733,693. Liquid Fuel Burner.—James B. Bladon, Montreal, Canada. July 14, 1903. Filed August 25, 1902.

733,773. Rotary Engine.—Robert R. Vogan and John H. Vogan, Allegheny, Pa. July 14, 1903. Filed February 25, 1903.

733,777. Rotary Steam Engine.—Frank J. Waters, Providence, R. I. July 14, 1903. Filed October 10, 1902.

733,818. Compound Turbine.—Gregory C. Davison, United States Navy. July 14, 1903. Filed November 8, 1901.

733,902. Air and Gas Mixer for Explosive Engines.—Thomas Charlton, Pittsburg, Pa. July 14, 1903. Filed August 27, 1902.

735,553. Motor Vehicle.—C. A. Hider, of Baldwin, Ind. June 30, 1903. Filed April 23, 1903.

No Cause for Alarm.

The New York Times is alarmed at a statement of Mr. Edison, that he will bring out a car which will make the distance from New York to Chicago at the rate of 25 miles per hour, and demands that something be done to stop him. The Times need have no fear. If Mr. Edison's automobile is as slow to arrive as his storage battery, the natural evolution of the pedestrian species (in agility) and the improvement in roads may make such a speed perfectly safe by the time he is ready to make the demonstration.

Dr. Ernest Duval, Rochester, N. H., and wife were out driving in their steam carriage on July 14, when the machine got beyond control and struck a large rock. The automobile was wrecked and Dr. Duval broke three ribs.

Panhard History.

Our French contemporary, *La Locomotion Automobile*, prints an article on the history of the Panhard-Levassor firm, which has attained some prominence in the automobile industry.

The firm was originally founded in 1855 by M. Perin, the inventor of the band-saw. Perin manufactured wood working machinery, and particularly the saw of his invention. In 1867 M. Panhard became associated with M. Perin, and in 1872 the firm of Perin, Panhard & Cie. was organized, to be succeeded in 1886 by Panhard & Levassor, and in 1897 by the "Société Anonyme des Anciens Etablissements Panhard & Levassor." In 1875 the manufacture of gas engines was added to the regular business of the firm, and in 1886 the manufacture of gasoline motors was begun, the firm having acquired the French patents of Gottlieb Daimler. The first automobile from the Panhard works made its appearance in 1891, the work of Emile Levassor.

Since that first vehicle left the works on the Avenue d'Ivry much progress has been made there and many improvements originated. The Panhard firm claims the credit of having introduced the practice of locating the motor in front; hand wheel steering; flanged radiators; the general transmission arrangement now commonly used, and armored wood frame construction. In the United States it is customary to introduce novelties at the great annual shows, but in France it has been the practice to build new vehicles for the great annual races, and for this reason many of the improvements were first seen at some particular race. Thus the Paris-Dieppe race, 1897, was characterized by the first appearance of the coiled radiator; the Paris-Amsterdam, 1898, by the introduction of wheel steering and four cylinder balanced motors; the Paris-Bordeaux race, 1899, radiator in front; the Tour de France, 1899, shok brake on the differential gear; Paris-Toulouse, 1900, reverse gear without shifting bevel gears; Paris-Berlin, 1901, cylinders and heads cast integral and mechanism with three point suspension; Paris-Vienna, 1902, steel cylinders and double acting hub brakes.

The firm claims to have been the first to have used nickel steel in automobile construction (for gear pinions and crank shafts), its first order for nickel steel being dated June 30, 1901.

The present line of the firm includes eight different types of vehicles from 5 to 60 horse power. The production is said to be 120 vehicles per month. The annual business transactions amount in value to 14,000,000 francs, one-third of which is foreign business. The total number of workmen employed in the works is 1,400. Besides automobiles the firm builds still wood working machinery and explosive engines for electric generating sets and boats.

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Devoted to
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For the issue of September 2, midway between the summer and the fall touring seasons, we announce a special Touring Number, confined strictly to this popular and most enjoyable pastime. The recent growth of automobile touring in the United States warrants as in promising a treat for all who are interested in the subject or who are susceptible to its charms and desirous of joining the increasing body of American auto tourists. One of the most interesting features of this number, naturally, will be the department set aside for the experience of tourists on the road in all parts of the United States and in foreign countries. In order to make this department as novel and helpful as possible the editor invites correspondence from any of his readers who can contribute suitable touring experiences within the specified time. Instructive data or any amusing incidents relating to touring are also desired. It is our intention in our Touring Number to provide solid information as well as entertainment, and to stimulate among the American public the love of nature and the most convenient and modern mode of enjoying it—automobile touring.

Numbering Section of Bailey Law Declared Unconstitutional.

In the Court of Special Sessions of the First Division of the City of New York, Section 106 of the Bailey law, in so far as it requires the carrying of numbers, was declared unconstitutional by a unanimous court on Friday last, August 7.

The case, known as that of the People vs. McWilliams, was a test case, and was defended by the Automobile Club of America, through its counsel, W. W. Niles. The section referred to contains this passage:

"Every person hereafter acquiring an automobile or motor vehicle shall, within ten days after acquiring same, register with the Secretary of State, as required by this section. This section shall not apply to a person manufacturing or dealing in automobiles or motor vehicles, except those for his own private use," etc.

In the brief submitted by Mr. Niles, he held that licensing and numbering were necessitated by requirements of public safety, but the exception made of dealers was unfair and objectionable. If the section contained a clause, "this section

shall not apply to the X Company and to the Y—Company," then its unconstitutional character would be perfectly plain, because it discriminated between members of the same class. Manufacturers and dealers are also owners of automobiles, and therefore form a class with the private owner. This section exempting dealers and manufacturers from compliance with its provisions is therefore unconstitutional, because it discriminates between members of the same class.

The court, composed of Justices Mayer, Olmsted and Wyatt, concurred in the opinion of counsel for defense, and declared the section unconstitutional, discharging the defendant.

That the law would not be sustained in the courts was predicted by the Law Committee of the A. C. A. at the time of its passage, and the recent decisions fully justify this prediction.

It is perhaps well to state here that the ruling of the court is only effective for New York city, and while it is now unnecessary to carry numbers in New York city, persons driving without numbers in other parts of the State would still make themselves liable to arrest. It is, moreover, likely that the case will be appealed. The District Attorney having announced his intention of taking an appeal, in case of an adverse decision, before the case came to a hearing.

The decision will have little immediate effect, but may pave the way for a more equitable law next fall. If the decision of the Court of Special Sessions should be sustained on appeal it would render the numbering clause void in all parts of the State, and as licensing and numbering are considered desirable under present conditions by both the authorities and the automobile public, there would be good reason for introducing a new automobile bill at an early date during the next session of the Legislature. It is to be hoped that by that time the various automobile organ-

izations of the State will have reached a mutual understanding on the legislative subject and present a united front.

New York-Pittsburg—The Great Event of 1903.

As stated in an article in another part of this issue, the N. A. A. M. at its last monthly meeting decided upon the route New York-Pittsburg, via Buffalo and Cleveland, for its coming endurance contest. According to present plans, the contest will be considerably more severe than any previously held in this country; it will cover a longer route, comprise greater daily runs and continue for a longer period than any of its predecessors.

Quite a number of changes have been made in the rules, as compared with those of last year's contest, some borrowed from the rules of recent English endurance contests and others entirely new.

In the report issued after the committee meeting it was stated that machines of American manufacture only would be admitted to the contest. When this rule was brought to the attention of agents for foreign cars they intimated that the cause of this rule was that the N. A. A. M. did not dare to admit their machines and that they would organize an endurance contest of their own. Thereupon, toward the end of the week, it was decided that the contest should be open to stock machines of both domestic and foreign manufacture.

Whether many of the agents for foreign cars care to avail themselves of the opportunity of participating in a contest controlled solely by the American manufacturers remains to be seen. At any rate, the foreign element will not be as conspicuous as it usually is in races.

Speed, of course, is to be no factor in the contest and all mention of speed in the official records will be avoided; the official observers, we are informed, will even be instructed not to give out any statements regarding the speed at which their particular car traveled. Every contestant will be allowed to travel at any speed convenient to him, except that he is held to comply with the law. This provision bids fair to avoid the nonsensical "loafing" near controls which characterized last year's contest; whether it will also prevent abuses in the line of speeding remains to be seen.

Two new and extremely interesting features of the coming contest will be that the cost of all repairs en route is to be determined and to be stated in the reports, and

that the condition of the cars at the end of the contest is to be judged and to be a factor in the classing. To determine the cost of all repairs will probably not be an easy matter, unless only money paid to outside repairers is to be taken into account. It is to be expected that repair charges will be rather high in some of the smaller towns, which are scheduled as night stops, for if half a hundred or more machines reach such a place the same evening after a 100 mile run, the equilibrium between demand and supply of repair facilities is bound to be considerably disturbed.

The judges or examiners who are required to determine the condition of the car at the end of the run will have no easy task if it is intended to determine the state of wear of all parts of the car. However, it is possible that the intention is only to penalize such cars as arrive with broken or damaged parts, such as broken springs, bent axles, etc.

The classification according to price and the requirement of carrying a load in proportion to the weight of the car are practical and reasonable rules. Very frequently a prospective buyer hesitates in his choice between a number of cars of practically equal price, and thus pitting vehicles of approximately the same price against each other in the same class would meet the requirements of prospective purchasers better than classification by weight. The rule as to weight carried will encourage refinement of design and reduction of weight without sacrifice in strength—which should be an object of every designer.

The Latest Idea in Racing.

It is generally conceded, even in racing circles, that speed trials on short straight or closed tracks, in which the vehicles run singly against time, cannot prove a lasting attraction for the general public. The sense of novelty may for a time influence people to go and see track races, but the novelty soon wears off, and little inducement is found to attend them.

This fact is not unknown to race organizers, and, consequently, they are on the look out for novel features and special attractions. It has been suggested that match races would be more exciting and a greater drawing card, and they have been introduced at a number of recent meets with more or less success. The latest suggestion to add to the interest of short distance races is to run them under the condition of standing start and stop. It is claimed that

tests of brake power are needed, and that races held under these conditions would depend almost as much on brake power as on actual speed.

The idea occurs that this kind of race must have been suggested by some manufacturer of pneumatic tires, for it certainly would increase the consumption of such tires. The aim of the driver would be to keep up top speed as long as possible and then stop as quickly as the power of the brakes and the adhesion of the tires to the ground would allow. With powerful hub and transmission brakes simultaneously applied it would be possible to block the wheels almost instantly, and tremendous strains would be thrown on the tires and other parts. The driver, unless he was securely strapped to the seat, and the latter of substantial construction, would be violently projected forward; tires would explode under the enormous strains, and there would be plenty of excitement to enliven the "fagged out" and to enthuse the "sports." These "standing start and stop" races are really a capital idea.

Location of Troubles.

It is an old maxim among gasoline engine men that when the engine stops or refuses to work, the first thing to look after is the spark, or the ignition mechanism. A majority of all gas engine failures are due to faults in the ignition, and of the rest most are due to defects in the gasifying and mixing apparatus, the carburetor. In nearly every case when an engine stops, it either does not get gasoline or there is not a sufficiently hot spark in the cylinder, or no spark at all.

At present owners frequently find great trouble in locating a fault when their engine stops for an unknown reason, chiefly because there are no means of directly and absolutely verifying whether the motor gets gasoline and whether a spark is produced in the cylinder. The occurrence of a spark can, of course, be ascertained with reasonable certainty by holding the spark plug connection at some distance from the spark plug and turning the engine over by hand. But whether the engine gets gasoline cannot be made absolutely sure without removing connections.

In a case which came under our notice recently the driver first tested the spark, but found it all right; then he opened a valve on the carburetor, from which some gasoline flowed, which satisfied him that there was nothing at fault with the gasoline

supply, and he once more turned his attention to the sparking system. After about a half an hour's fruitless effort to locate the trouble he sent for an expert, who discovered in a few minutes that the gasoline tank was empty. Of course, there was still a little gasoline in the bottom of the carburetor, but, being considerably below the normal level, not enough got into the cylinder to form an explosive mixture, and the engine stopped. That there was some gasoline in the carburetor was no sign that gasoline got into the cylinder.

In experimental engines mica windows are sometimes placed directly over the spark plug points, through which the spark in the cylinder can be directly observed. There appears to be no reason why such windows could not be regularly fitted to engines over the spark plug, and also on the inlet pipe just outside the inlet valve. If spark and mixture could be directly observed many a tedious search for a fault might be saved.

Only Stock Machines in the Endurance Contest.

Only stock machines regularly listed and offered for sale to the public will be admitted to the endurance contest, and racing machines will be barred. In the first long distance endurance contest ever held in this country and in several of the one day contests attempts were made by owners of racing cars to convert the contest into a race and to startle reporters of the daily press by their speed performances. Such methods naturally detract from the practical character of a contest and are unfair to those competitors who abide by the rules.

While the organizers can easily prevent racers from taking part in the contest officially, they appear to have no means at command to prevent them from running

along unofficially. Such unofficial cars may prove a veritable nuisance to the regular competitors, and if there are any means of keeping them out such means should be applied. We noticed in the daily press that one firm had already announced its intention to send one of its powerful racing cars over the route unofficially, just to show how much better this car is than those allowed to be entered.

Guides for Valve Stems of Gasoline Motors.

By HUGH D. MILLER.

The general design of a valve stem guide depends largely on (1) the location of the valve relative to the clearance chamber; (2) the type of valve (automatic or mechanical); (3) the valve operating mechanism, provided the valve is mechanically operated; (4) the metal employed; (5) the amount of finish allowed. The present article relates in particular to those guides which are located between the head of the cylinder and the crank case, and which are adjacent to the cylinder water jacket. Such valve stem guides are almost exclusively used in connection with valves that are mechanically operated, although automatic admission valves are sometimes placed next to the exhaust valves, in which case these valves may be of the same pattern, and therefore interchangeable.

In all the accompanying cuts the valve stem guides are shown in longitudinal section, as are the cylinders. Fig. 1 shows a guide in what may be regarded as its most popular form. It is cast integral with the jackets, and is sometimes bushed with bronze. Such a bushing is turned up, driven into place, and then drilled and reamed. The plain guide, as shown in the illustration, undoubtedly represents the cheapest possible type to produce. In stationary and marine engines such guides are so designed as to leave no space between the jacket wall and the metal of the guide proper, both above and below. With a given distance between the centres of the cylinder and the guide, the latter construction calls for more metal—"dead" metal.

A long valve spring being desirable also, preference must be given to the type shown in Fig. 1.

To insure perfect alignment of the valve seat and of the guide both are reamed by the same tool and at the same time.

Guides that are screwed into the cylinder casting are nearly as popular in the United States as those of the variety just described. Bronze or hard brass are the metals used out of which to turn them. That portion of the fitting that abuts against the casting is generally of a hexagonal cross section, although it is a bad place to get at the hexagon. Spanners are deservedly in little favor, and the same must be said of special pins as tools.

In Fig. 2 no means of screwing the guide in or out is indicated. The guide is shown in close proximity to the jacket casting in order to afford a good sized water space. In all cases in which a hexagon is provided the water space must be narrow all around, or the jacket must be flattened, unless the distance between cylinder and guide centres can be made to conform to practically ideal cooling requirements.

In Fig. 3 a type of guide is shown of which little favorable can be said. While it does not call for a tapped casting, threads must nevertheless be cut and a hexagon is required. Means for guarding against rotation of the bushing while the nut is being screwed on or off must be provided, although not shown in the sketch. A socket wrench or a spanner would do, but both are unsatisfactory from the standpoint of cost. Screw drivers of the usual size carried in a tool box would not be suitable, and any special tool should keep company with the sockets and spanners. That this kind of a bushing cannot be removed without taking out the valve is obvious. Furthermore, gasoline or kerosene cannot be squirted into the guide to lubricate the stem by removing the spring and stem only.

The bushing, which serves as a guide and which is shown in Fig. 4, requires no tool or wrench of any kind unless it be a hammer or its equivalent, and a block of wood with which to drive it in or out. So good a fit as this is un-

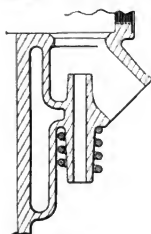


FIG. 1.

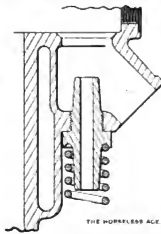


FIG. 2.

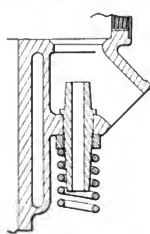


FIG. 3.

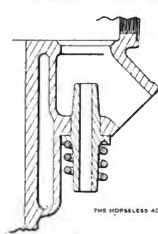


FIG. 4.

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called for, however, for the spring will hold the guide in place, unless the valve is an automatic inlet valve, in which case a loose bushing should be dropped into place from above.

In low cost of production the type illustrated by Fig. 4 approaches that shown in the first sketch. No thread being cut on the bushing, interchangeability is more readily secured than in cases 2 and 3, and owing to the absence of a hexagon the water jacket need not be contracted, because of the presence of the guide bushing. Reaming of the valve seat may be done with the guide bushing in place or not, since the bushings are turned up as well as reamed in the lathe in all establishments that have adopted the interchangeable system. After the hole into which the bushing goes (Fig. 2) has been drilled, the valve seat can be reamed accurately, provided a shank projects from the reamer and extends through the hole mentioned, the wall of which serves as a bearing.

The above method may be employed in cases 3 and 4 or the bushings may be used as a bearing for the seat reaming tool.

Notes on Steam Car Construction.

By J. S. V. BICKFORD.

I have conducted a considerable number of experiments on the relation between steam making capacity and heating surface, and have found that in a water tube boiler heated with oil fuel the evaporative efficiency is about 7 to 9 pounds per square foot per hour for moderately economical work. The maximum amount I have ever noticed to be produced from 1 square foot per hour is a little over 10½ pounds, and this was when the tubes were all bathed in flame. On the other hand the casing used was not very good, so that it is not impossible that after working some time (so as to get its casing hot) a water tube boiler might be forced into making about 10 pounds of steam per square foot per hour. I think that we shall not be far from the truth if we take this as the limit.

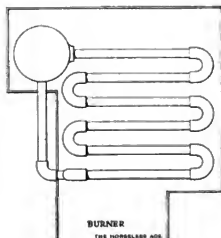
The next point to be considered is the horse power required, and this will depend on what is to be demanded of the car. If expense within reason is to be no object I am inclined to think that ideal conditions as to speed will nearly be met for touring purposes by a car which will take a hill of 5 per cent. at 20 miles per hour with its full complement of passengers aboard. With such a car one can keep up an average of 20 miles per hour over most fairly made roads without ever exceeding 22 miles per hour, a result which is nearly as good as the average man wants.

The power required to do this will depend on the weight of the car and the road resistance. I have found in my own practice that a car to seat four persons built as one would build in ordinary engineering practice—that is to say, not flimsily in any part, and having a boiler with tubes one-

eighth inch thick—will weigh when finished a trifle over a ton. To this must be added 600 pounds for passengers and something more for fuel and water. In an earlier paper on this subject I arrived at the conclusion that a car of this kind should run 150 miles without taking supplies, so that the fuel and water in the present car must be enough for such a run.

It is found in practice that the steam car will run from 6 to 10 miles per gallon of oil. As we are considering a high class article it will probably be safe to take it that it will travel 9 miles per gallon. We shall, therefore, have to carry 17 gallons of oil weighing about 140 pounds—say 150 pounds in round numbers.

The water to be carried will depend on the leakage in the steam joints and the efficiency of the condenser. I have on a former occasion published in THE HORSELESS AGE details of my experiments on atmospheric condensers, in which I showed that with a condenser of 27 square feet of cooling surface 18 pounds of steam might



be condensed per hour in a fresh breeze. If we anticipate matters a little, and assume that the car under consideration will use about 120 pounds of water per hour (for 15 miles), we probably shall not be far wrong. Leakage of glands and unavoidable leaks here and there will probably account for fully 2 gallons per hour in everyday use, so that it is essential to condense as much of the exhaust as possible. The above figures for atmospheric condensation work out to two-thirds of a pound of steam per square foot per hour, a result in very fair agreement with other people's experiments. To condense 120 pounds of steam per hour will, therefore, require 180 square feet. In my own car I have allowed 200 square feet, and I do not think it too much. On the whole it will probably be found with such a condenser that there is a waste of about 4 gallons per hour all told, for it must be remembered that though we have provided for the condensation of 120 pounds per hour, or nearly the steam from 5 horse power, yet the power developed and the steam consumed on a steep hill will be much in excess of this, and at such times we shall still only condense

from 120 to 140 pounds per hour, all the rest being wasted. To cover the 150 miles it will be necessary, therefore, to carry 40 gallons of water. Incidentally I may mention that the Gardner-Serpollot carries about 45 gallons and runs 100 miles on one charge, but the condenser provided is not large enough. We have, therefore, to carry 400 pounds of water and 150 pounds of oil, which with 600 pounds for passengers make 1,150 pounds, or a total weight for car and load of 3,400 pounds, in round numbers.

The draught due to a hill of 5 per cent. will then be 170 pounds. What the road resistance will be is not so easy to arrive at. M. Michelin, in his somewhat historic experiments, gives the resistance of solid tires, at 6 miles per hour, at from 75 to 80 pounds per ton. That is to say, a vehicle so tired would just descend a grade of 3.5 per cent. I am inclined to think that it is rather above the mark, and that a hill of 3 per cent. would probably suffice. If that is the case the resistance would be 65 pounds per ton. But it does not follow that the resistance is 65 pounds per ton at 15 miles per hour, and it is all but certain that such is not the case. In my own car I had a pressure gauge so fitted as to be visible from the driver's seat and communicating with the steam chest of the engines. It will be seen that such a gauge gives a rough comparative indication of the resistance experienced by the engines from moment to moment. On the test stand with the brake on the flywheel such a gauge showed that a variation of about 10 pounds pressure more than doubled the speed of the engine (the pressure to start with being about 35 pounds per square inch). Now on the road it was found that the car would travel about 5 miles per hour on the level with 35 pounds steam pressure, while it required and always does require between 50 and 60 pounds to drive her 15 miles per hour over the same ground. The cut-off in the engines is 50 per cent. If the road resistance at 5 miles per hour be taken at 65 pounds, the resistance at 15 M. P. H. will then be just over 100. Such figures cannot be accepted as final, and only act as a guide. My own opinion, which has been formed by many circumstances, is that the resistance at these speeds is about 85 or 90 pounds per ton on good macadam. The car we are considering will, therefore, encounter a resistance due to road of 135 pounds. Adding this to the hill resistance already found we get 305 pounds. To move this resistance at 20 miles per hour would require a little over 16 horse power on the wheels.

The next point to consider is the steam consumption which will result at such a power. At lower powers (around and about 2 or 3 B. H. P.) I have found the steam consumption of single acting engines of about this size to be from 27 to 33 pounds per B. H. P. hour, the former result being obtained with a compound engine. I believe, however, that considerably

better results may be obtained at high powers. In the first place leakage does not tell so much, and secondly the internal resistance of the engine does not rise in the same proportion as the indicated horse power, so that the mechanical efficiency rises. On the whole it is probable that 16 B. H. P. might be obtained with an expenditure of 350 pounds of steam per hour. Taking our already fixed limit of 10 pounds steam per square foot of heating surface per hour this gives us 35 square feet as the heating surface of our boiler.

The next point to be considered is the grate area and the burner capacity.

It is a mistake very often made by designers who have not had experience with liquid fuel that the area of the grate does not matter. The grate area is as fixed for liquid fuel as for coal. There is a certain limit of combustion per square foot of grate area per hour. It is not that more petroleum vapor could not be burnt on the size grate, but that it is impossible to pass the gases through or between the boiler tubes unless these are spread out to cover a certain area.

In my own first Bellville boiler the tubes, as already stated, were so spaced as to give a total area of gas space of about 70 square inches, but I made the mistake of reducing the size of the furnace below this so that the boiler casing was formed as in the sketch. The result was that we could never get the boiler to work properly without a funnel blast at any oil pressure exceeding 15 pounds per square inch, and even at that it smoked slightly.

We may, therefore, take about to pounds per square inch oil pressure as the limit for this boiler. At this pressure the burner used burns 1.5 gallons per hour, and the grate area is 13 inches by 15 inches, or nearly 1.4 square feet. This gives a consumption of 1 gallon per square foot per hour, but I believe that this may be considerably increased if the tubes are so spaced that the gases may find their way through them. With a funnel blast my boiler will burn about 3 gallons per hour, or 2 gallons per square foot per hour, but this appears to be very near the limit. If we take this as the limit for our boiler, and an oil consumption of 50 pounds per hour as the maximum, we get a grate area of about 3 square feet.

It is probable that the oil consumption will not be far off the above figure if the superheater is used in the smoke box and not under the burner, and if an efficient exhaust steam feed heater is used. This consumption is based on about 1 pound of oil per 7 pounds of steam, which would be fairly good at the maximum output of 10 pounds of steam per square foot per hour. The writer's present boiler has 30 square feet heating surface and 2.75 square feet grate area.

A hill climbing contest at Fort Lee hill is proposed in connection with the fall reliability run of the N. A. A. M.

Treatment of Cork Floats.

One of our readers writes that the cork float of his carburetor became so soaked with gasoline that it closed the needle valve too late, not keeping the gasoline in the float chamber down to the proper level. The float was taken out and treated with liquid celluloid, which entirely remedied the trouble. It is thought that beeswax would also have answered the purpose, and the following method of applying it is recommended: Take a dish of water and melt the beeswax in the water, which will enable you to regulate the thickness of the film of beeswax by the quantity that you melt into the water. Then take the cork float and dip it into the wax, while the wax is floating on the water, which will make an even coating or film all over the cork.

The Proposed New York-Chicago Highway.

The New York and Chicago Road Association, Park Row Building, New York city, is sending out a circular relating to the proposed highway between this city and Chicago. It will be remembered that the association sent a delegation, composed of two of its officers, over the route last year, who held "good roads" meetings at many of the towns passed through and secured pledges of co-operation from many local authorities.

It is the purpose of the association to continue the agitation by the aid of the press, dissemination of literature regarding the project, and by personal visits of the representatives, who will spend as much time as possible in each locality. There is no other public improvement so important as the improvement of the highways, as good roads when built will benefit every person in a community.

The proposed route leads from New York city up the East Side of the Hudson River to Rhinebeck, thence through Ulster, Delaware, Broome, Chenango, Tioga, Chemung, Alleghany, Cattaraugus and Chautauque counties in New York, to Erie, Pa., thence it follows the lake shore to Toledo, Ohio, and on to Chicago through Indiana. Among the important cities and towns the route touches are Poughkeepsie, Kingston, Owego, Elmira, Corning, Hornellsville, Salamanca, Wellsville, Jamestown and Westfield in New York; Erie, Pa.; Ashtabula, Cleveland, Lorain, Sandusky, Clyde, Fremont, Toledo and Bryan in Ohio; Butler, Goshen, South Bend, La Porte, Valparaiso and Hammond in Indiana, and Chicago. Some stretches of the road are improved, and work is started on other portions. About 160 miles of the road in the lower tier of counties in New York State will be completed this year. Efforts are being made to have the stretch of road in the panhandle of Pennsylvania finished as quickly as possible.

Improvements in parts of Ohio are also being made. Fully 25 miles in and out of

Toledo, and 20 miles at Hammond are improved. That this proposition of building a continuous road is popular and meets with universal favor is shown by the co-operation already secured.

Accessions to the membership of the association are solicited, the membership fee being \$1 annually.

Luminous Device for Studying the Operation of High Speed Valve Motions.

In dealing with slowly moving mechanism it is easy to determine by observation the exact motion of the different elements constituting the machine. At high speeds this is less easy, and where cams are made use of for actuating certain parts it is impossible to find out what happens at high speeds from observations made at low ones, since the inertia effects only become of importance when the speed is great. A method of observing the motions of rapidly moving parts, such as, for instance, the opening and closing of the exhaust valve motion of a high speed petrol motor, was described by Professor H. Hospitalier at a recent meeting of the Paris Society of Civil Engineers. In principle the plan consists in illuminating the valve motion in question by flashes of intermittent light. If these flashes occur regularly at every cycle of the motor the valve gear will appear quite stationary, while if the periodicity of the flashes is slightly decreased the motion will appear to run through its complete cycle, but at a very slow speed, and in doing so every vibration it makes will be clearly observable. An instrument specially designed for researches of the kind in question has been constructed for M. Hospitalier by MM. Malicet and Blin, of Paris.—*Engineering*.

Calendar of Automobile Dates and Events.

- August 10-22—Tourist Motor Bicycle Reliability Trials.
- August 19-20—Meeting of the Association of Licensed Automobile Manufacturers at Niagara Falls.
- August 20—International Races of the Frankfurt Automobile Club, Frankfurt-on-the-Main, Germany.
- September 4-5—Cleveland Races.
- September 6-13—Vienna Automobile Week.
- September 7-8—Detroit Races.
- September 11—Syracuse Races.
- September 18-24—English Reliability Trials.
- September 19—Narragansett Park Races.
- September 19 or 20—Empire City Track Races, Yonkers.
- October 2—Brighton Beach Races.
- October 5—Paris Cab and Delivery Wagon Trials.
- October 7-14—New York-Pittsburgh Endurance Contest.
- December 10-25—Paris Automobile Exhibition.

Inlet Valves.

(Abstract from a report by M. Lumet to the Second International Automobile Congress.)

Before making a comparison between automatic valves and valves mechanically operated, I shall examine the part played by the spring in automatic valves.

The piston when making the suction stroke causes the inlet valve to open, but with a certain lag, owing to the resistance of the spring surrounding the valve stem. M. Gerard Lavergne, in a series of articles in the *Revue Industrielle*, has made a calculation of the friction of the piston stroke during which the valve remains closed. Suppose, he says, we are dealing with a vertical cylinder, with downward power stroke, fitted with an admission valve of 50.5 millimetres diameter (20 square centimetres cross section), held down by a spring of 450 grammes pressure. The compression space we may assume to be .25 litres and the piston displacement 1 litre. These figures fairly represent an average case.

The effort which the spring exerts on the inlet valve (.0225 kilog. per square centimetre) has the effect of retarding the opening of the valve. The valve will only be lifted when the spent gases which remain in the cylinder at the end of the exhaust stroke have expanded sufficiently for the difference of the pressures on the two sides of the valve to equal the spring pressure. The weight of the valve is here neglected, though for absolute results this weight should be added to the pressure of the spring.

We therefore have $p + .0225$ kilog. = 1.0336 kilogs, and $p = 1.0111$ kilogs.

Mariotte's law permits us to calculate the volume V which the gases then occupy:

$$\frac{V}{.25 l} = \frac{1.0336}{1.0111}$$

from which we obtain

$$V = .2555 l$$

The volume V swept through by the piston since starting from the dead centre is therefore

$$V^1 = V - .25 l = .0055 l$$

and represents 5.5 per cent. of the total displacement of the piston.

Gerard Lavergne remarks that this volume V^1 is of little importance; he adds that Mr. Edge estimates that in the Napier motor a piston displacement of 32 millimetres (one-eighth inch) suffices to cause the lift of the valve, while often 12.7 millimetres (one-half inch) is thought necessary.

It is evident that this fraction of the cylinder volume cannot be considered lost, as the combustible mixture fills the whole of the cylinder volume. Yet it is certain that the cylinder volume receives less mixture, owing to the lag in the opening of the valve, particularly at high speed.

This retarding action is augmented by the fact that the speed of the piston is very low near the beginning of the stroke.

If we assume the time of admission to be of sufficient length to draw the entire

cylinder full of charge, the amount of the charge would still be less than without the action of the spring. The pressure in the cylinder at the moment of closing would only be 1.0111 kilogrammes instead of an atmospheric pressure of 1.0336 kilogrammes per square centimetre, because when the pressure within the cylinder has attained a value such that when added to the tension of the spring it equals atmospheric pressure, the spring closes the valve, and the combustible mixture ceases to enter the cylinder. The difference in pressure is an exact measure of the deficiency in the quantity of charge admitted; in this case it is 2.2 per cent.

I have made a number of observations on this point in some experiments I conducted at the laboratory of the Automobile Club with a pressure indicator of Mahot-Garnier. Upon the automatic admission valve of a single cylinder horizontal Gillet-Forrest motor I arranged a device which permitted varying the tension of the spring, at the same time making it possible to measure this tension. The diagrams thus obtained show that the point of intersection of the curve corresponding to the suction and the horizontal line representing atmospheric pressure is the farther removed from the beginning of the stroke the greater the spring tension, and the greater the speed of the motor.

These diagrams also show that the pressure at the end of the intake stroke diminishes when the tension of the spring is increased, which conclusively proves that less charge is admitted when the spring is stronger. The results shown by these diagrams are quite appreciable, but it is impossible to measure them, as they are complicated by the effects of the inertia of the apparatus.

Although this loss has the effect of diminishing the specific power of the motor, I believe that it is of comparatively little importance. A more important factor is the lag in the closing of a valve with a weak spring.

According to Mr. Edge, the bubbling which is observed in the passage of a surface carburetor is caused by the abrupt stopping of the current of charge by the closing of the inlet valve, causing the charge to flow back.

Examination of the diagrams convinced me that during the return stroke of the piston, the period of compression, the gaseous current is forced backward. Only a rapid closing of the valve by means of a strong spring can prevent a part of the charge admitted to be forced back past the inlet valve.

The diagrams show that the point of intersection of the atmospheric line and the compression curve is the nearer the end of the stroke the stronger the pressure of the spring. Besides, the mean ordinate of the compression curve is greater with a stronger spring. With the Mahot indicator I was able to measure the compression at the end of the stroke with different spring tensions,

and found it to increase with the spring tension.

Consequently, by increasing the pressure of the spring we decrease the specific power of the motor, but increase its efficiency. When the motor turns at low speed below 500 revolutions per minute for instance, there is no advantage in a strong spring. The retardation in the opening of the valve will diminish the specific power, and there will be no compensation owing to more rapid closing of the valve, which in that case is of less importance.

Let us now examine the conditions of operation of a mechanical valve. The mechanical valve motion is identical with that employed for the exhaust valve.

We may use a strong spring, as just mentioned, and open it by means of a cam at the moment we desire. We thus secure our double purpose, but there is one objection that may calm our enthusiasm: Have we not thus considerably complicated our motor without having gained any appreciable advantage?

The inlet valve cams are mounted on a shaft parallel and similar to that for the exhaust valves, driven by a gear symmetrical to that for the exhaust. This arrangement has been adopted by the firms of Mors, Decauville, Coteau and Mercedes. The inlet valve cams may also be mounted on the same shaft as the exhaust valve cams, the two valves being arranged on the same side of the motor. This arrangement has been adopted by the firms of Renault, Clement, Huber and Mercedes.

In the case of a four cylinder motor of a power not exceeding 20 horse power I believe that there is no advantage in using mechanically operated valves. I know well that for running the motor at slow speed the mechanical valve presents certain advantages. But it is the normal speed that deserves consideration, and not the exceptional speed, and the advantage to be derived does not justify the complication and the increase in cost of construction which would result. Mechanically operated valves are only advisable for motors of great power.

In order not to require a great lift of the inlet valve which would increase the effect of the spring on the power, it is necessary to make the valve of large section. Unfortunately a valve of large section has a tendency to become deformed. A number of manufacturers have devised special means of getting around this difficulty, which consist either in making the valves with annular concentric seats, or in employing several valves for a single cylinder.

A German firm has brought out an automatic signal horn with shut-off valve to prevent unauthorized persons from sounding the horn when the car is unattended. Another curtailment of the pleasures of the small boy.

TOURING IN

AMERICA.

VII.—Hudson River, Southern Section.

By C. H. GILLETTE.

Although there are many rivers in America the volume of water of which is greater than that of the Hudson, there is none, all things considered, which presents so many changes of scenery and such delightful views for the tourist as does the valley of our great New York State waterway. The Hudson once ran through a sunken continent to a point about 300 miles south of its present outlet

while nearly all of the Eastern river valleys have a beauty peculiarly their own. The Hudson River Valley has the advantage of combining more different kinds of scenery than any other American district.

The eastern bank of the river is, of course, the most intimately known to automobile tourists, and naturally so, because on the west bank from Nyack on there is very little in the way of good roads. In addition to the fact that the roads are not as good, the hills are very much worse on the west side, making it on the whole less desirable for automobile touring than the opposite shore.

Everyone who has done any touring knows the direct road north from New York along the river to Albany, and it would be scarcely possible to find anywhere a pleasanter trip than this or one so

right fork toward Garrisons, and just before reaching this point turn sharp to the right to Cold Spring. The route from there is straight through Fishkill Village and Wappinger's Falls to Poughkeepsie, which by this road is 76 miles from New York.

From New York it is possible to go out Riverside drive and along Washington Heights to Kingsbridge, from which point you can go direct to Yonkers.

From Spuyten Duyvil, as far as the eye can reach, one is unable to see anything except ground which is rendered memorable in history as the scene of many struggles during the Revolutionary War. After the defeat of the patriot army in Long Island it was evident that New York must be abandoned to the British. The sick and the wounded were hurried to



VIEW OF THE HUDSON RIVER FROM THE HEIGHTS ABOVE TARRYTOWN.

into New York Harbor. Geologists assert that that part of the river which remains is really only the headwaters of the prehistoric stream. Tourists, since the days of touring began, have made comparisons between the Rhine and the Hudson, and to this day there are as many partisans of the American river in the discussion as there are believers in the superiority, from a scenic standpoint, of the great German stream.

The Palisades, the Highlands, and the comparatively level reaches to the north all have their ardent admirers, while the fact that the automobile tourist in traversing the valley of the Hudson passes these very different kinds of country makes the Hudson River trip, as a whole, one of the most restful to the eye to be found in all the Eastern States. That is to say,

full of points of interest. Almost from the time one leaves New York there are not only attractive views of the river and mountains, but also spots of historical interest.

The route is out Jerome avenue and into Moshulu avenue to Yonkers. From there on is what formerly was called the "Old Post Road," but which is now known for almost its entire length to Albany as Broadway. Beyond Yonkers it passes through Dobbs Ferry and Irvington to Tarrytown. Still following close to the river, the route is through Ossining and Croton to Peekskill. Just beyond Peekskill is the famous Nelson Hill, around which a new road has been constructed, so that this most trying grade is now no longer an objectionable feature of this route. At the foot of the hill take the

New Jersey, and Dobbs Ferry was made the centre for military stores and baggage. Washington moved to Kingsbridge, where he established headquarters, and fortifications were erected in the Harlem Valley.

Spuyten Duyvil may be considered as the line beyond which the British never succeeded in achieving an occupancy, though at times they made incursions into the territory held by the Americans. From this fact arises the great historic interest which attaches to all of the points along the lower Hudson River and to many above Poughkeepsie and Newburgh.

At Yonkers the most remarkable building, from a historic standpoint, is the Philipse Manor House, erected in 1680 and now used as the City Hall. A movement is now on foot to sell the property to the



VASSAR COLLEGE, POUGHKEEPSIE. MAIN ENTRANCE.

State and have it used as a Revolutionary museum. It is still an elegant example of the colonial house of the best class and is chiefly remarkable from the fact that George Washington once had a love affair with Mary Phillipse, the daughter of the then owner of the mansion. Many of Washington's friends expected that he would marry Mistress Phillipse, but she eventually became the wife of Colonel Morris, a British army officer.

Dobbs Ferry was an important post during the Revolution and the rendezvous of each army alternately. Here the British troops gathered after the battle of White Plains and before marching to the assault upon Fort Mifflin. The first treason-

able interview between Arnold and André was to have been held at Dobbs Ferry, but for some reason did not occur there.

Notable is the highway from Irvington to Tarrytown. It is lined throughout its entire length with stately homes, among which may be seen the Helen Gould estate, "Lyndhurst." The ruins of the burned home of the painter Albert Bierstadt can also be seen from this highway.

The wide stretch of water opposite Tarrytown is known as the Tappan Zee. This is the very home of the Irving legends and the thousand and one fanciful stories which have gone into literary history as commemorating this region of the Hudson. Nearly all of the points on the shore of

this wide reach of water are mentioned in the stories of Washington Irving and his literary contemporaries.

The principal of these points is Sleepy Hollow, whose famous legend is too well known to require more than casual mention here. At Sleepy Hollow is the grave of Irving and near by a tall shaft of granite supporting a grand figure surrounded by six marble statues representing Jesus and symbolical figures of Immortality, Faith, etc., is collectively known as "The Memorials of the Delavan Family," well known in the vicinity during Colonial and Revolutionary times.

Near Sleepy Hollow, on Broadway, is a monument commemorating the capture of Major André by John Paulding. David Williams and Isaac Van Wart on September 25, 1780.

Just above Peekskill on the hill are the ruins of Fort Independence, where the Revolutionary troops were quartered from time to time. There are many historical legends relating to various characters and spots in the vicinity of Peekskill, and its beautiful location at the en-



BRIDGE AT POUGHKEEPSIE.



COLLEGE LAKE, NEAR VASSAR COLLEGE, POUGHKEEPSIE.

trance to the Highlands makes it particularly attractive. The railroad is very close to the river and the highway, just above Peekskill narrows, but the road is back from the river on the east bank, although it follows it quite closely on the west side. It comes to the river or nearly to it at Cold Spring, but from there runs inland through Fishkill Village, and does not really touch the river again until Poughkeepsie is reached.

There are several roads branching east from the main road which are very good for automobile use. There is a good road, for instance, from Yonkers across to New Rochelle, on the Sound, a distance of 7 miles, and the road is good macadam, although rather hilly. From Tarrytown to Port Chester, on the Sound, is 14 miles, the route being through White Plains. There is a splendid piece of road, the best part of which has been recently constructed, running through Ardsley and just back of Tarrytown, through Amawalk to Lake Mahopac, and from there on to Carmel, from which point a fairly good road leads to Danbury, Conn. This road is one of the best for automobile use.

to be found in the whole State, and it goes through a delightful country.

Lake Mahopac is a beautiful spot, and being so easily accessible is well worth a visit. From Fishkill Village there is a dirt road through Fishkill Plains and Stormville to Carmel, and from there into Danbury. By using these side routes some delightful circular trips through this section can be planned.

From Poughkeepsie, in addition to a direct road north along the river, there is a good road leading east through Pleasant Valley, Washington Hollow and South Millbrook to Millbrook. From there, turning right between the bank and a general store in the centre of the town, a road leads through Mabbittsville, Lithgow, Amenia and Sharon, Conn., to Lakeville, from which point a splendid road leads north through the Housatonic Valley to the Berkshires. The above is the route generally taken in going from New York to Pittsfield or other points in the Berkshires, and taking everything into consideration it is doubtless the best route, affording as it does good roads for



SUNNYSIDE, THE OLD HOME OF WASHINGTON IRVING.

burgh to Middletown, and from there on to Port Jervis. From Highland, opposite Poughkeepsie, there is a splendid macadam road to New Paltz, and a macadam road leads south from there practically direct to Middletown.

Although the west bank is by no means as full of historical spots as is the east bank, nevertheless there are many points of interest. The road along the Palisades offers some of the most attractive scenery to be found anywhere in the East.

The highest point in the Palisades is known as Tower Hill. This is accessible most readily from Nyack. It has an observatory on its summit and is well worth a side run, though most of the trip to the summit must be made on foot. From the observatory can be seen the hills and valleys of Westchester County, the Sound, Long Island, the Atlantic Ocean, Orange

Mountains and the Catskill and Berkshire ranges.

At Haverstraw the Hudson is 5 miles wide, actually the broadest point in its course, and as the channel of the river keeps well over toward the westward bank the automobile tourist at this point is able to see much more that is interesting on the eastern bank than can tourists on any of the river boats.

In this vicinity is Cruger's, near which Baron Steuben so carefully drilled the recruits in 1776, and Montrose, from which point the best view of the Highlands of the Hudson can be obtained.

North of Haverstraw Bay is Verplanck's Point, and across from it Stony Point, the latter being notable as being the scene of the celebrated battle where Gen. Anthony Wayne achieved his famous victory.

West Point is always of interest to patri-



WASHINGTON'S HEADQUARTERS AT NEWBURGH.

the greater part of the way, good station facilities and splendid hotels. Nearly all of the hotels along the Hudson are enthusiastic in their welcome to automobilists and many have provided special conveniences.

The route ordinarily taken northward on the west side of the river is that leading through Ridgewood, N. J., and Suffern, N. Y., to Tuxedo. From there to Newburgh the road which follows the river most closely is through Englewood on the Palisades, and from there through Closter, Tappan and Sparkill to Nyack. From there on to Haverstraw the roads are still good.

From Haverstraw to West Point is a good macadam road, but the grades are very heavy and it is a route not usually taken. The Tuxedo route is very little longer than the river road and is good for practically the entire distance to Newburgh. From Newburgh to Poughkeepsie the most available road is on the east bank, crossing the ferry to Matteawan and going north along the river road into Poughkeepsie.

There is a very good road from New-



ANDRE BROOK, ONE OF NATURE'S BEAUTY SPOTS NEAR "SLEEPY HOLLOW."

otic Americans, and though somewhat difficult of access to touring automobilists, it is nevertheless a possible touring objective and its attractions are well worth the inconveniences of the trip.

It has recently been discovered that the river opposite West Point shows the greatest depth known throughout its entire length, although there are a number of spots elsewhere where the water is from 20 to 24 fathoms deep. The deepest point is just north of West Point, where a 50 foot fathom line recently failed to touch bottom. This is at a comparatively narrow place on the river, where, during the Revolution, a chain was placed as an obstruction to the British men-of-war.

On the west shore of the river, just above West Point, are the masses of crags of Cro' Nest and the Storm King. The former has attained prominence in the history of American literature as being the scene of the celebrated fairy story in verse, "The Culpit Fay," by Joseph Rodman Drake. At this point there are many mountain peaks extending out to the shores of the river and forming picturesque headlands.

Cornwall has achieved much fame on account of having been the home of Nathaniel P. Willis for many years. His house, "Idlewild," is still a resort for thousands of tourists every year. Nearby are the fruit farm and mansion of the late E. P. Roe, the famous novelist, and not far away is the pretty roadside home of Amelia E. Barr.

At Newburgh the centre of attraction is the house occupied by General Washington as the general headquarters of the Continental Army from April, 1782, to August, 1783. It stands in plain view from the river or from the Peekskill shore, near by being the "Tower of Victory" erected in the same grounds. The house was originally the home of Jonathan Hasbrouck, a farmer, miller, merchant and leading man in the community. It is now a public museum, having been bought by the State of New York in 1849 and placed under the care of a board of trustees. It was dedicated in 1850 with impressive ceremonies, the flag being raised by Maj. Gen. Winfield S. Scott.

General Washington and his family occupied the entire house, and their most notable guest was the Marquis de Chastellux, one of Rochambeau's officers. He wrote an interesting account of the home life of the "Father of His Country" and of the admirable military discipline which prevailed among the soldiers quartered there.

The southern section of the Hudson Valley is not to be taken "on the jump" as a touring ground. The writer of these papers can give only a limited number of notes of the many delightful spots and points of interest to Americans and visitors alike. It is a touring ground to be gone over carefully and leisurely, taking plenty of time to lay out the itinerary of the coming day as the tourist rests over

night at one of the excellent hotels (with adequate garage appointments) which are to be found everywhere. It is a touring ground which is historic nearly every foot of the way. The inhabitants of the various towns through which the way passes are more than glad—they are eager—to tell of and show the local points of interest. So that at least a week can be spent to advantage in covering the valley—east and west shores—below Poughkeepsie.

Serious Fire in New York Garage.

One of the most serious automobile garage fires that has occurred in New York city for some time burned out the third floor of Speck & Sire's storage station, at 121 West Thirty-first street, on the morning of August 4. Seven expensive foreign cars, two belonging to H. Van R. Kennedy, a New York banker, and the others said to be the property of the garage owners, were badly damaged—the bodies and upholstery being burned beyond hope of repair, and much injury being done to transmissions, springs, radiators, wheels, tires, etc. A number of machine tools were also somewhat injured and a considerable quantity of new and second hand tires suffered badly from the flames. The fire was confined entirely to the third floor—the repair department—and the damage to the building was comparatively light.

The origin of the fire is much of a mystery. It started in one of Kennedy's machines while one of the shopmen was working over it—burning his arms rather badly—and it is insisted that no light or flame was in the vicinity. One theory suggests that a spark thrown from a hammer might have set fire to the oily waste that was first found burning; another possibility advanced is that of a short circuit in the ignition circuit.

Contrary to the reports of the daily press, there seems not to be the least ground for the belief that any gasoline was concerned in the affair. The proprietors of the garage claim that no gasoline is ever permitted above the first floor, and that each machine has its tanks emptied before being permitted in the shop. These claims seem well substantiated by the appearance of the place immediately after the flames were extinguished. The tanks on all the machines, although melted open in several cases, were empty, and there was no evidence of any fire as violent as gasoline would have caused having been around them. In fact, the fire appears to have fed almost wholly upon the oil soaked floor, the greasy belts of the machinery and the light woodwork of the bodies. The damage that resulted was more a consequence of the value of the property exposed than of the violence of the flames.

Estimates of damage run variously from \$5,000 to \$20,000. More definite figures can hardly be given until it is determined how much repairs the machines will need.

LESSONS OF THE ROAD

Tales of Summer Touring.

BY HARRY B. HAINES.

These warm summer days, when the thermometer plunges up into the 90's and all humanity is sweltering, are truly the harvest times of the factory, the repair man and the sales agent, for it is in the summer time, after all, that automobiles hold sway; and the cool breezes of horseless motion are worth all they cost, and more.

The touring lad that has struck the country also has me in its grasp, and I have joined the long run constituency who delight in covering miles by the hundreds. Incidentally I have been paying for my pleasure in the proportion usual for owners of horseless vehicles, who venture after experiences in strange localities.

500 MILES IN TWO WEEKS.

Within a period of two weeks I have ridden over 500 miles in my machine, having toured to Asbury Park and down the Atlantic coast, over through New York to the famous Coney Island, through dreamy Long Island to Far Rockaway, and later in the direction of Oyster Bay, over the sandpapered roads of that famous automobile Utopia.

In those 500 miles I have burned between 38 and 40 gallons of gasoline, or perhaps more, as I have not kept an exactly accurate record, and have figured about 130 miles on each tank of 10 gallons of gasoline. I have used a pound or more of grease, and less than 2 gallons of cylinder oil. I had only one puncture and ended up with a glorious smash and crash, by blowing up my muffler, which was shattered and split by the explosion of half a hundred charges of gasoline that had been forced back into it while the motor was skipping spark, and that went off in harmonious accord when the spark plug resumed operations again.

START FOR ASBURY PARK.

I started out with a friend one morning for a three days' jaunt through Southern Jersey, having Asbury Park as our destination. We rode along in the full appreciation of our swift motion for the first 50 miles, stopping once to oil up, but experiencing no difficulty of any sort. We covered this distance in less than three hours' time, not pushing the machine in the slightest, and were continuing across the Jersey Barrens to Old Bridge when suddenly without the slightest warning the motor ceased sparking and gave every indication of stopping. We were going down hill at the time and allowed the machine to continue until its own momentum was exhausted, and then we piled out to ascertain the trouble.

A hasty peep into the gasoline tank

proved that there was still a goodly supply of the precious fluid contained therein. The next move was to trace the battery connections and see if they were intact, and a hasty investigation proved that this was so. The spark box was next dissected, and the distance between the platinum points that break the spark was carefully noted and measured with the brass rule furnished for this purpose. The points were found to be a little too far apart and were reset, but still the motor refused to explode.

Both of us were a bit provoked by this time, and while my friend made himself comfortable under a shady tree, I started in to dissect the carburetor, fearing that the tin float might have sprung leak and filled with gasoline, preventing it from performing its proper functions. After all my trouble I found that the carburetor was in good condition and working excellently, and this most important bit of mechanism was put back in its place and coupled up again.

There was only one other thing to be looked at, and that was the spark plug. My friend, who owns a machine of the same make as my own, had taken out the plug a short time after we made our first stop to oil up, in order to make sure that it was in good shape, and I was of the opinion that the trouble would be in most any other place but this one. But like all other mortals I was not infallible.

CRACKED PORCELAIN THE CAUSE.

Upon getting the plug out I at once saw that the porcelain was cracked, and when I showed it to my friend he remembered that when he had put the wire terminal in place he had used a large wrench to tighten the set nut, and had, without noticing it, tightened down the nut that held the plug packing in place, thereby cracking this most necessary part of our sparking apparatus.

Being tourists of some experience, we were, of course, prepared for just such an emergency, and when our spare plug was inserted the engine started at the first turn, and we were off on our way rejoicing in less time than it takes to tell it.

I do not want to appear to be blaming everything on my friend and fellow passenger, who is a royal good fellow, but our next hold-up was undoubtedly due to his efforts to help out and be obliging.

When he had helped me start the motor he had kindly opened the little priming cock that allows a flow of gasoline to fall on the suction screen. In his hurry to get off he had failed to shut this tightly and the gasoline continued to drop down on the screen in a fair sized stream. This, besides depleting our supply of gasoline, gave the motor more gas than it could dispose of, and as a result of the rich mixture it heated up considerably more than I have ever seen an air cooled motor heat before. Strangely enough, we were not stalled by this extra supply and had no trouble until the outskirts of the village of

Eaton town were reached, when the motor again ceased its activity and we were stalled. No doubt the greater portion of the gasoline running out of the priming cock had been blown back on the road and away from the suction screen by the rush of air from the fan and the wagon speed.

The manner in which the motor stopped led me to believe that our gasoline was gone, and I at once looked into the tank. I noted that there was still a small quantity left, but the angle of the road we were on, the machine having stopped near a gutter, had allowed all the fluid to run to the side of the tank opposite the supply feed pipe leading down to the carburetor.

We pushed the machine up to the centre of the road and were able to start the motor again, and had gasoline enough to run back to the centre of the town, about a half a mile distant, where we secured an additional supply. On our return trip, a day or so later, we took the precaution of carrying an extra gallon of gasoline in a tin can to prepare for any unexpected emergency.

A NEW KNOCK.

We reached Asbury Park in good shape, but noted on the last few miles that the motor had developed a new knock, and a strange one.

Being too tired to investigate after our long run, we left the car until the next morning, and upon starting the motor with the floor boards up, I noticed that the front end of the motor was loose, the long screw bolt that goes through the angle iron frame and into the motor head having jarred loose, in spite of the lock nut provided to hold it. It was necessary to jack the motor up before this could be tightened, but once the bolt had been drawn firmly into place this disagreeable noise disappeared and was heard no more.

We spent two most enjoyable days touring up and down the Atlantic Coast, 50 miles in either direction, and had few if any troubles of importance, and, strange to relate, not a single puncture or tire trouble.

We experienced considerable difficulty in starting the machine on the morning of our return home, some inquisitive person having monkeyed with that "ever troublesome" priming cock during the night, and, of course, allowed it to run, covering the floor with gasoline and filling the cylinder.

After the spark plug had been removed it took full twenty minutes of hard work at the starting crank to get the gas out of the cylinder and put it into shape so that the machine would run again.

STORAGE FACILITIES INCREASING.

Incidentally I might mention that the storage business along the coast is improving, a lot of former bicycle repair men having fitted up what they call repair shops and storage stations, mainly consisting of a few monkey wrenches, a barrel of gasoline and a can of cylinder oil

under an old shed. They get all sorts of fabulous prices for the butchery that they call repairing, and charge a dollar a night for a single machine and a dollar and a half for a tonneau. They invariably manage to so locate themselves that they have a monopoly in their particular section, and it is a case of take what they offer or leave your car out in the rain. The rates charged include what they call cleaning, which nine cases out of ten means that some underpaid negro will scratch your paint up with a pair of greasy overalls in an effort to remove the dust and mud without wasting any water, which I understand is of great value in these places, being sold to steam carriage men at profitable rates.

Our return trip home was made in good time, the only incident of importance being a delay occasioned by the inlet valve (which is not mechanically operated) failing to work, the cotter pin on the end getting loose and allowing the tension on the spring to loosen. Luckily we discovered the trouble before the cotter pin worked out entirely and allowed the valve to be sucked into the cylinder and ground up, which would indeed have been a serious catastrophe. A new and heavier cotter pin remedied this difficulty.

THE HIGH SPEED CLUTCH

gave me considerable annoyance by continually slipping back after it had been locked in place. The spark and gas rod also had a tendency to do this, and when going uphill at high speed it was difficult to hold both of these levers forward. At a blacksmith shop along the road we secured the loan of a rat-tailed file at the reasonable charge of 25 cents, and, locking the high speed into place, marked the place where the pin holding it came, and then filed out a slot in the clutch arm so that this pin would fit into place. It was only about ten minutes' work, and after that this one annoyance was disposed of.

We finally arrived home in good time, having completed over 300 miles of touring. We rested up for a few days, using the machine around town, until I decided to go on another trip. It is my custom about every two months to pay for ten hours' time at 50 cents an hour and have the body taken off my car and every nut and bolt gone over and tightened. All the play is taken up in the bearings and the machine is put in exactly the same shape as it was the day I received it. I decided to have this done and laid the machine up for that purpose.

"NEVER BORROW TROUBLE"

is an old maxim and a good one, but I did not heed it when I prevailed upon the local agent with whom I "stable" my auto to loan me a machine to use until mine was ready.

He very obligingly consented to do so and pointed out to me a single cylinder tonneau of a popular make that the manufacturers rate at 7 horse power and ask the public to pay \$1,000 for. It was such

a pretty little car, with a long, spidery front and the cutest little dink tonneau that anyone could ask for, with side lever steering and a general appearance of being able to "get there."

From the outside it was not a half bad car, but a peep under the seat at the little motor reposing alongside of the flywheel and two speed and reverse sun and planet transmission gear did not impress me with the idea that the car was going to break any records with only two passengers, and I felt that if four people were loaded in I would be in the same class as the man who beats his horse because it cannot pull the load he puts on it.

CAR BALKS.

The machine that I was to go out in was standing ready with the tanks filled at 2 o'clock in the afternoon when I called for it. Everything appeared to be in good shape, but upon turning the starting crank the motor did not respond, despite the fact that the spark coil was buzzing loudly and there was apparently nothing wrong.

I turned the handle for about ten minutes and then called for help, which came in the form of a dirt begrimed mechanic. He undertook the turning job, but with no better success than I had met, and finally he decided to remove the spark plug. The plug was found to be very smutty, having been blackened by the use of too much oil. The plug was cleaned, and when tried outside the cylinder gave an excellent spark. The mechanic decided to turn the engine over a few times in order to clean the foul gases out of the cylinder, and as he ground the starting crank a shower of fine spray shot out of the spark plug hole.

GASKET BURNED OUT.

It was apparent at a glance that the cylinder head gasket had been burned out. It was rather a long job to take out the necessary bolts and repair this, and as the mechanic started in to do the job I went out for an hour and a half, returning at half-past 3 to find the job completed.

Despite the new gasket, the motor would not start, and it was then discovered that the carburetor was out of adjustment. This particular mixer was of the float feed type, and the supply of gasoline was regulated from the seat by a small lever there. This lever was out of commission and it was necessary to try the carburetor at all its points before the motor finally condescended to start. It exploded weakly for a few times and then stopped, but finally was made to go fairly strong and we ventured outside the station. The engine seemed to speed up fairly well, but it developed no power, and the machine would scarcely travel over a level street on the high speed.

I managed to get down town and back by a liberal use of the low speed gears, and late in the afternoon returned the machine to the station.

(To be continued.)

A Two Weeks' Vacation with an Automobile.

By F. W. HIGGINS, M. D.

The diagrams of proposed new differentials which appear in THE HORSELESS AGE are still a little beyond me, but I read every one of the "Lessons of the Road." I suspect that some seem very amateurish to the veterans, and I notice that the fellows in our repair shop do not read them at all, but they have a very vital interest to me and have helped me out of trouble more than once. In recalling my two weeks' vacation with my machine this summer I find that I am like the rest—my troubles come soonest and sharpest to mind. But they have been transmuted by the intervening short time and distance to the most interesting events of the trip.

I started in a drizzling rain, because I could get away that Monday morning and I was afraid that if I let the opportunity slip it would mean another week or two at home. I declared to my son, who was to be my traveling companion, that we would drive slowly and easily and would use the machine carefully, a resolution we broke half a dozen times before we got to bed.

The farmers had just got about doing their annual road scraping before this rain-storm. That forenoon we traveled only 16 miles down the Tiohognaga Valley because it took us over an hour to get out of a ditch into which the machine had slewed. I here finally learned why it would not crank up when one side was down by the fence. I think the reason is that the float in the carburetor rubs against the side of the chamber. If on one side, you get no gasoline; if on the other, you are flooded.

Our first night we were the belated and only guests at Coventry Hotel, having made 47 miles in the mud and rain over the hills of Central New York State. We spent nearly two hours trying to climb Beebe Hill, just into the village, but gave up at 11 p. m., to submit to the disgrace of being hauled in the next morning. The hill, bad enough at first, had been rendered impassable by two days' thorough work with the road scraper. We pulled some of the boulders and sods from the road with our hands, but a good deal of work must still be done on Beebe Hill before I can recommend it.

The feather bed and the impression the machine stuck in the mud had left on my mind were the causes of my getting up soon after 4 the next morning. The car did not act lively, but managed to get us down to the Susquehanna Valley, where the roads were passable. I wonder if any of the brethren have ever noticed that the deepest mudholes in the road are just at the foot of the hill where you want to get up speed for the grade ahead.

We were a little late for dinner that day, because at the town we reached at noon we were being followed by a young farmer with a rich vocabulary, on a bareback

horse, who wanted damages and proposed to have us arrested. This horse jumped out of a barnyard into the road ahead of us, and ran in the particular road we were taking for over a mile. Its owner was speedy on foot and the horse did fairly well so long as we were all up grade. After we struck the valley we lost sight of them.

At Oneonta we were ready for repairs. We took a side trip on the stuffy steam cars until the machine could be washed up and overhauled and the roads got dry. The "lesson of the road" that I thoroughly learned is to take a good book with you on an automobile pleasure trip. When it rains or the mud is still thick and heavy, read the book in some comfortable hotel. You will get home the more quickly.

From Oneonta the trip through the Catskills to the Hudson was a perfect success without a drawback. East Windham claims to be the highest hotel in the mountains, but it is reached by an easy continuous grade from the west. Here the view of the Hudson Valley and Berkshires is immense. From Catskill we went north five miles to Athens, where one ferries across to Hudson. Here we were helped out of a rather odd predicament by an ingenious bicycle repairer. We discovered that our chain was loose, and furthermore that the regulating screw on that side and all its attachments had fallen off. We borrowed a screw jack such as is used for lifting buildings. With a scantling sawed the right length this jack got a purchase on the front axle-tree and so threw back the hind one and tightened the chain. The side rod was bolted fast and the chain gave us no more trouble during the rest of our trip.

From Hudson to Great Barrington there is a good toll road. Of course everybody knows what a trip means up through the Berkshire Hills to Bennington. Do not neglect to pull the rope that opens the gate to the Sloan grounds between Stockbridge and Lenox. One is allowed to drive in to this lake, from which the Westinghouse place and a paradise in general are to be seen.

From Bennington, Vt., to Troy, N. Y., the roads midway are poor, but the last 10 miles is a fine new macadam road. From Troy to Schenectady and to Amsterdam there are two many new electric railroads. An automobile has to travel on the space left at one side of them. At Schenectady our machine got the coolest reception we met on the trip. The hotels had no place for it and seemed to imagine we had better take it out into the country.

At Canajoharie we made the acquaintance of a very much disgusted owner of a machine, a medium weight gasoline run-about, the same make as my own. He had run from Albany, his first day away from the good roads about Brooklyn. He had been helped through a piece of new road by Italians, and his machine was cov-

ered with mud. He intended to send it home as freight.

We left the Mohawk Valley at Fort Plain for Richfield Springs. We started up a very pleasant road following up the valley of a creek, but the end of that valley where we left it is about 1,800 feet higher than the other. From here to Cortland the old Cherry Valley turnpike takes one most of the way on roads as good as can be expected, since they continually cross the ranges of hills of Central New York.

The refrain of my account of the trip to my friends, since my return from a vacation of most pleasant memories, is a plea for good roads. If we could have a State road east and west through the centre of the State and another through the southern tier, how much it would add to the pleasure of a jaunt!

On the last day I broke one corner of my chassis, probably from hurrying over pitch holes to escape a thunder shower. At least we discovered it after the shower caught us. We had to ride slowly or walk for 8 miles to find a blacksmith. Four of us worked all the afternoon to get a piece of angle steel bolted into the corner, but it traveled as good as ever after the job was done.

I am doing my work much better for my two weeks away. As I recall the jaunt now, my dream of the first night at home comes back, made up of Berkshire Hills and a quiet lake in the background, the middle distance made up of geying kids, women climbing out of a buggy and over a fence, crowded streets, steep grades and a mud hole, while the figure in the foreground, almost hiding all the rest, is a horse on his hind legs, undecided whether to run past the machine or whirl and run the other way to find a crossroad.

The New York-Pittsburg Endurance Contest.

At the meeting of the executive committee of the N. A. A. M. last week it was decided to hold an endurance contest from New York to Pittsburg via Cleveland next fall. The run will start on Wednesday, October 7, and end in Pittsburg on Wednesday, October 14. The various stopping places have not yet been definitely decided upon, but the daily stages will probably be as follows:

October 7—New York to Pinehill....	135
October 8—Pinehill to Binghamton....	110
October 9—Binghamton to Corning....	70
October 10—Corning to Buffalo....	120
October 12—Buffalo to Erie.....	100
October 13—Erie to Cleveland.....	95
October 14—Cleveland to Pittsburg....	140

The route includes roads of all kinds, leading through the Catskill Mountains and the sandy plains along Lake Erie. The first and last section are undoubtedly the best, although the last section is quite long—140 miles.

NEW VEHICLES AND PARTS.

The Berg Fifteen Horse Power Gasoline Tonneau.

At the Automobile Show in New York last January the Berg Automobile Company, of Cleveland, Ohio, introduced its cars to the public for the first time. In our show numbers the principal features of this make of vehicle were described. A number of improvements, chiefly in the running gear, have since been made by the builders to improve the riding qualities of their product. In general these machines are modeled on French lines, but there is less complication, especially in the lubricating devices and their appurtenances.

The wheel base of the car is long and the gauge is standard. Exceedingly long semi-

from one end and then an end plate, which contains a bearing, is bolted to the case. As there is no joint in a horizontal plane the strains to which the case is subjected cannot cause leakage of the lubricating oil. The flywheel is of generous proportions, and it is stated that the motor can be run at a speed as low as 200 revolutions per minute. The inlet valves are automatically operated and have a cage which prevents the spring, the washer and key from dropping into the cylinder should the valve stem break. In that case the valve cannot get into the cylinder proper, because the passage between the valve chamber and the cylinder is too narrow. The exhaust valves are located on the left side and the carburetor on the right hand side, close to the control devices. The spent gases are discharged downward from the cylinders at an angle of about 45 degrees into a pipe of



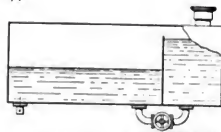
BERG LIMOUSINE "IN THE WHITE."

elliptic body springs are employed, those in front being 42 inches and those in the rear being 46 inches long. Five plates in front and six in the rear are used, all of which are 2 inches wide and about one-quarter inch thick. The wheels are shod with 34x4 inch detachable tires, on the selection of which an option is given the purchaser. The frame is of the armored wood type, with sills and cross pieces of seasoned white ash.

The engine has four cylinders cast together in pairs with integral heads. The bore is 4 inches and the stroke 5 inches. At a medium rate of speed the motor is said to develop 15 horse power on the brake and, it is claimed, that it will develop considerably more when accelerated. The crank shaft has three bearings, which are of generous proportions, as are the crank pins. All bearings throughout the car are bronze bushed. Unlike most crank cases this case is made of one piece. The shaft is put in

cast bronze. A steel tube is connected to this pipe at one end and to the muffler, which is not at the extreme rear end of the carriage. After leaving the muffler the gases pass into a pipe and then escape to the atmosphere. The use of a pipe extension to the muffler is said to have proved a very good feature, as it effectually silences the exhaust. The carburetor is of the company's design and is of the float feed type. Only one is employed. Air and gas control is provided, which may be set by the accelerator pedal. The centrifugal governor acts on the gas only.

Ignition is by the jump spark system and storage batteries. The latter are in three sets and are said to be of a type which will stand the vibration caused by traveling on rough roads. Each cylinder has its induction coil, to which a high speed trembler is fitted. A centrifugal pump, driven off the flywheel, is employed to circulate the cooling water. The radiator is built in



GASOLINE TANK OF BERG CAR.

the bonnet in front and has sloping sides. It consists of twelve vertical and twenty horizontal rows of one-quarter inch tubes, which vary in length between $9\frac{1}{2}$ and 22 inches. The tubes are all provided with flanges and are all expanded into headers, which have end plates that may be readily removed whenever cleaning of the tubes becomes necessary. The water tank has a capacity of 12 gallons and is located under the tonneau. The accompanying cut illustrates the gasoline tank, which embodies a new feature. The tank is located under the front seat and is of rectangular section. It consists of two chambers, which are separated by a partition that does not quite reach up to the top of the tank. The small chamber holds about 2 gallons and the large one 14 gallons. The fuel flows into the small chamber first, and as soon as it reaches the edge of the partition runs over into the large chamber until it is filled. Fuel is drawn from the large chamber and flows directly to the carburetor. When the supply is exhausted the engine ceases to run. The operator opens the bypass valve, which permits the fuel to flow from the small chamber. With this supply of 2 gallons it will, in most cases, be possible to reach a supply station before all the gasoline shall have been consumed.

The transmission gear is of the sliding variety and affords four forward and a reverse speed. The large gears of the secondary shaft are all bolted to flanges on that shaft and are cut to a metric pitch of approximately No. 7. The friction clutch is of aluminum, leather faced and provided with flat springs between the leather and the metal of the clutch to prevent slipping. The gears run in an oil bath and are also provided with grease lubrication. The gear and differential case are cast integral, side chain drive being employed.

Steering is effected by means of a hinged hand wheel and a Malicet et Blin steering gear, which comprises a worm, long sleeve, rack and pinion, all of which work in an oil tight crank case of bronze. For the steering column it is claimed that, owing to its relatively small angle with a horizontal plane, the control of the wheel does not tire the operator, even on long runs. Two quadrants and thumb levers are secured to the steering column to time the ignition and set the governor spring. By varying the tension of the latter it is claimed that the speed of the engine may be varied between 200 and 800 revolutions per minute. A further increase in the speed of the engine may be had by pressing down the accelerator pedal. The brake pedal applies a double acting brake on the countershaft. The hub brakes, which are also of the double acting variety, are controlled by a hand lever in the usual way. This lever may be thrust forward without relieving the latch, as the teeth of the quadrant are of the saw tooth type. A cable is interposed between the hand lever and the hub brakes for the purpose of equalizing.

The dashboard fittings comprise four coils with high speed tremblers, a water circulating indicator, a grease cup for lubricating the transmission gears, a three way switch and a magazine oiler. This lubricator, a large rectangular casting, into which the grease cup is built, contains three compartments. A sight feed is fitted to this case, by means of which the rate of flow to the compensating gear may be ascertained. In the large central compartment is located a pump with two plungers, which is driven by a worm gear device by means of a belt driven pulley. One of these plungers pumps oil to a sight feed and the other pumps it from this sight feed to the cylinders, which are thus provided with direct, in addition to splash, lubrication. In the third compartment kerosene for cleaning the cylinders is stored. A small plunger pump with press button communicates with this chamber. Another pump of identical design is fitted to the box and provides a means for hand lubrication of the cylinders in emergency cases.

Some other novel features of this car are to be found in the distributor. The auto-

matic latch for the starting crank and the gate latch. The distributor is of peculiar and novel design. A ring of fibre holds four brass segments to which binding posts are fitted. A small ring is mounted on the cam shaft with a crescent shaped steel spring, which is provided with a sliding shoe that is pressed against the inner annular wall of the fibre ring. For this device it is claimed that it insures perfect contact at all times. Few machines on the market are provided with a device that holds the starting crank in a horizontal position and locks it positively when out of use. A catch which does this is fitted to this car. Owing to the fact that it never hangs down or revolves when traveling along the road a greater road clearance is obtained. A very positive, simple and practical latch is fitted to the top of the tonneau gate. In addition to the ordinary latch proper it has an eccentric locking attachment, which insures against the door opening accidentally.

The Berg Company has adopted the policy of building the chassis only and purposes to leave the construction of the body to body makers, who will build them under the direction of the purchaser.

Kells' Gasoline Tank with Gauge Glass and Graduated Scale.

A gasoline tank is being manufactured by W. J. Kells, of Jersey City, N. J., which is provided with a scale graduated in gallons from which the amount of gasoline remaining in the tank can be read off directly. The tank is made with a depression in one of its side walls in which a gauge glass is located, which is connected to the tank by fittings at the top and bottom. The bottom fitting enters the tank from below, and the uncovered part of the glass extends to the level of the tank bottom, allowing readings to be taken until the whole supply of gasoline is exhausted. A scale is fixed alongside of the gauge glass on the wall of the depression, and is graduated in gallons. These tanks can be fitted to either old or new cars, and are made in a size suitable to fit into the seat of the car.

Electric Automobile Chairs for the St. Louis Exposition.

A feature of most of the universal exhibitions has been the wheel chairs in which ladies, elderly and infirm persons were wheeled around the grounds by uniformed employees of the company owning the chairs, at a certain charge per hour. At the coming St. Louis Exposition these chairs will be electrically propelled, in conformity with modern progress. A concession has recently been given by the Exposition authorities to a St. Louis company to operate these chairs, and a construction invented by Semble S. Scott is to be employed. An illustration of this appears herewith. The chairs will have a speed of 3 miles per hour—the same up hill, down



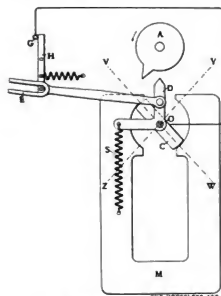
KELLS' GASOLINE TANK.

hill and on the level—and the operator has no control over the speed. The general design is that of a low phaeton without cover. Room is provided in the seat for two visitors, sitting side by side, one doing the steering, etc. If desired an attendant, for whom an adjustable seat is provided at the rear, can accompany the vehicle. The controlling levers are then removed from the front and inserted in sockets at the rear of the car. A feature of the machine is a "sensitive rail" which surrounds the chair on all sides save at the rear. The object of this rail is to prevent accidents, for when the rail comes in contact with any object, even though it weighs but a pound, it presses against a device that locks the wheels and brings the chair to a dead stop.

The illustration is from the *Scientific American*.

The Deliege Magneto Ignition.

A contact or hammer break system of ignition in which the current is furnished by an oscillating magneto has recently been brought out in France under the above name. Referring to the diagrammatic illustration of the apparatus herewith, M represents the permanent field magnet, which encloses a Siemens shuttle armature pivoted upon the shaft O. The armature has a rocking or oscillatory motion about this shaft, which is effected by means of the lever D, which works against a spring S. The lever is operated from the motor by the cam A. When the projection of the cam strikes the lever it makes the armature swing from the position VW to that of YZ; when the projection passes the lever the latter is quickly drawn back to the position VW by the spring S. This movement sets up a strong current in the armature, as its circuit is closed inside the motor cylinder through the spark contact. This contact takes place between the insulated projection G and the lever arm H, the latter being worked by a fork E which



DELIEGE MAGNETO IGNITER.

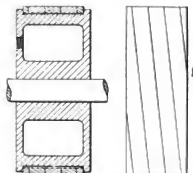


ELECTRIC AUTOMOBILE CHAIR FOR THE ST. LOUIS EXPOSITION.

is also operated by the cam. During the passage of the armature to YZ the circuit is closed at GH, but when it returns the fork strikes the lower end of the lever H and makes a quick break between G and H. This causes a spark to pass at the contact, which ignites the gas. The movement is regulated so that the break occurs at the position of maximum current in the coil.

Spiral Piston Rings.

In a recently issued United States patent is described a spiral piston ring of which a number of views are shown herewith. A ring of this kind would seem to have a number of advantages over separate split rings, as commonly used on gasoline engine pistons. In the first place it would avoid the slit in the ring, which is a frequent cause of leakage. The pressure against the cylinder wall would be distributed more evenly all around the circumference, and there would be less danger of the ring breaking.



TWO SPIRAL PISTON RINGS.

Agriculturists Object to Removal of Speed Limit.

After a long and involved debate, a special council meeting of the Central and Associated Chambers of Agriculture, held at the Society of Arts, London, on July 21, carried a resolution to the effect "that no motor cars bill will be satisfactory unless the maximum speed is generally defined."

This resolution was sent to Walter Long, chairman of the Local Government Board, who replied that he was unable to agree with the Chamber of Agriculture in this matter. He was advised by those who are administratively in touch with the question of safeguarding the public that the present legal limit of speed does not in fact constitute any effective protection to the ordinary users of the roads. The effect of the legal limit is rather to distract the attention both of the police and of the motorist from the vital question, the safety of the public, to the comparatively unimportant and in all cases highly controversial question of the actual speed in miles per hour at which a particular car is traveling.

A controversy has arisen in England as to whether in Charles Jarrott's accident in Ireland "a priest choked some whiskey down Jarrott's throat" or whether "Jarrott asked for some whiskey and a priest standing near produced a bottle of it, etc." It seems to us that it is a matter of little moment whether the whiskey was taken on Jarrott's or the priest's initiative; the important thing is that it was at hand when needed; we suppose the good priest carried it for just such an emergency as this.

-COMMUNICATIONS-

Greater Durability Wanted.

Editor HORSELESS AGE:

I recently toured from Baltimore to Boston by way of Gettysburg, Pa.; York, Philadelphia, New York, New Haven, Springfield, etc., and hoped to have some interesting experiences to relate, but the truth is that outside of the personal admiration by myself and wife of the scenery, the beautiful country and the delightful experiences of traveling by automobile I have not a thing of interest to report, because my steam runabout went the entire distance, two days running in the rain

could have been made sufficiently strong and "wearable" by the manufacturer at practically no additional cost, and with no interference with the style or neatness of the machine. While I believe some manufacturers are trying to improve in this direction, the wearing parts of the average machine are much too light and narrow to stand the wear and tear which is put upon them. I think you undersand just what I mean.

Now, manufacturers must not forget one important point in this connection: the men who have been and are now buying machines are buying their first machine upon the recommendation of an agent, possibly at the suggestion of a friend, but without that intimate knowledge of the details of machine construction and of what ought to be expected in the wear of parts which is sure to come

ises greater endurance and consequently better results. There may be a few enthusiastic owners who are willing to turn in their machine for a new one every year, as has been the practice with many bicycle owners. This, I predict, will not be the rule, but the exception. When I find a machine that is satisfactory, and that is giving me good service, I shall be slow to make a change. Almost every owner is likely to add improvements of one kind or another to his machine to suit his convenience and his special requirements, and, besides, the automobile is a vehicle of much greater general utility than the bicycle or any of its predecessors in the way of mechanical transportation.

There are many other reasons for urging the attention of manufacturers to securing greater durability in automobiles. R.

Licenses Required in Cincinnati.

CINCINNATI, Ohio, August 8.

Editor HORSELESS AGE:

An ordinance requiring owners of automobiles to take out a license has recently gone into effect in Cincinnati. The enclosed photograph is a snapshot taken by one of our local druggists as an officer of the bicycle squad was examining the writer's license. L. S. COLTER.

Fan Cooling.

Editor HORSELESS AGE:

I have an air cooled motor, rated 2½ horse power, mounted on a vehicle. It overheats, and I am thinking of providing it with a fan to cool. The motor is vertical. Would you advise that the fan be so situated as to play upon the head from above or at one side, so as to take in the cylinder? It has occurred to me that a fan playing downward would only reach the head and first ribs, while, on the other hand, a fan at the side of the motor would reach only all the ribs on one side. I will be obliged for any advice upon the subject. W.

[Usually it is the valve chamber that needs cooling most, and it would probably be the best plan to direct the air current against the cylinder from the side on which the valve chamber is located.—Ed.]

Explosion Engine Query.

Editor HORSELESS AGE:

Will you please inform me what proportion of the explosion in a gasoline engine escapes after it is fired?

I have a 4½ by 4½ inch cylinder, which at 1,500 revolutions gives me 8 horse power.

What I would like to know is what proportion of the charge is exhausted.

JOS. TAYLOR.

[You probably mean what proportion of the power of the gasoline is lost through the exhaust. This cannot be answered, as it depends upon the particular



CINCINNATI POLICEMAN EXAMINING AUTOMOBILIST'S LICENSE.

and mud, without the necessity of turning a screw, except once to tighten up stuffing boxes.

In this connection, however, there are some points to which I should be glad to see so influential a publication as THE HORSELESS AGE give considerable attention, and one is the seeming lack of attention on the part of the manufacturers of automobiles to the wearing parts of their machines. In my association with owners I find the common criticism to be that machines will wear out in an unreasonably short space of time at a number of important points, and that the materials used are not of the right quality or quantity.

My own experience, which duplicates that of many others, is that 80 per cent. of all my repair bills have come from replacing or repairing worn out parts that

later. The fellow who is getting ready to buy his second machine is an entirely different sort of a chap from the fellow buying his first machine. From what I have learned from others, the average manufacturer is very stubborn on these points, and this has been my own experience. Of course, many owners are not competent to give technical criticism, but it's the man who buys the machine and uses the machine who must in the end be satisfied, and if he discovers weak points in the mechanical construction of the machine that are vital to its longevity and endurance, and the source of the annoyances and delays of having repairs made, to say nothing of the expense connected therewith, he will give that machine a black eye every time, and when he is ready to buy he will buy some other machine that prom-

conditions—the amount of charge drawn in at every suction stroke, the temperature of the cooling water, etc. If we assume that the cylinder fills with charge to atmospheric pressure at every suction stroke and that the mixture is of the right proportion, you would burn 136 pound of gasoline per minute (about $\frac{1}{2}$ gallons per hour). The energy contained in 136 pound of gasoline is equal to 64 horse power for one minute, so that if your engine develops 8 horse power just one-eighth of the energy of the gasoline is transformed into useful work and seven-eighths are wasted in the water jacket, through the exhaust, by friction, etc. How much is lost through the exhaust alone can only be determined experimentally.—Ed.]

Grades.

Editor HORSELESS AGE:

Mr. Clough's article on grades brings to mind a curious fact that may be new to some of your readers.

Simply stated it is this: The true slope of an up grade is more apparent when looking down than when looking up. A look in the rear will generally explain why the car swiftly mounts a seemingly steep grade or vice versa.

The reason for this illusion is not clear; maybe it is due to the same cause that tends to make the height of a building or mountain appear greater when a view is taken from the top than when the top is viewed from the bottom.

It is not uncommon for demonstrators to choose such a hill to show you the hill climbing qualities of their cars. However, it is well to check foresight with hindsight before being convinced.

R. H. BEAUMONT.

Imports of Automobiles.

In the quarter ending March 31, 1903, the following exports of automobiles to the United States were declared with U. S. consuls abroad:

Aix-la-Chapelle (automobiles).....	\$3,309.39
Brussels (automobiles).....	1,702.26
Yver (automobiles).....	3,421.50
London, Ont. (motor).....	100.00
Marseilles (automobiles).....	5,558.40
Paris (automobiles and parts).....	288,732.00
Rheims (automobiles).....	6,622.80
Turin (auto fittings).....	4,053.00
Total	\$313,499.35

Trade Literature Received

Brownell & Humphrey, Detroit, Mich.—"Oldsmobile Advertising." (A book of advertisements of the Oldsmobile which have appeared in magazines.)

The Post & Lester Company, Hartford, Conn.—Volier Automobile Horns



Competitive Test of Searchlights.

The Automobile Club of the Rhone (France) a short time ago organized a competition for automobile lamps and searchlights. The tests have now come to a conclusion and a report on them has been drawn up by M. Pilain, who acted as secretary to the jury of the contest.

The merit of the various lamps submitted for trial was ascertained as follows: The committee having the test in charge installed in a spacious dark room a shadow photometer with a large black screen pierced at the centre by a square hole, 4x4 inches, in which was arranged a wood frame of 8 inch thickness. In front of this frame, vertically in the centre, was placed a reflector of 4 inch sides, for the purpose of throwing the shadow on a piece of paper fixed behind the frame. At 48 inches from the screen was placed the standard lamp, an electric incandescent lamp of sixteen candle power for 110 volts. The photometric results are given in multiples of the distance of this standard lamp.

When the photometer tests were concluded the jury proceeded to study the facility of filling the lamp, lighting and extinction after two hours' burning. Twelve hours after extinction the lamps were lighted again for a short while, and then the generators or carbide containers were cleaned out. The jury then obtained from the various manufacturers information on the design of each lamp, the method of closing, the tightness of joints and the manner in which the carbide is attacked.

In the tests on the road the distance was first ascertained at which it was possible to just read ordinary newspaper print, and then the fixity of the flame on a moving vehicle was determined. The entries were divided into five classes, as follows: (1) acetylene generators; (2) acetylene searchlights and lamps selling at 100 francs or less (generator included); (3) same, selling at 101 to 200 francs; (4) the same, selling at over 200 francs; (5) kerosene lamps.

In nearly all the generators entered ordinary carbide was used, but a few employed "acetylithe." The systems were very different from each other, and some highly ingenious. A certain type of generators with large surface of attack gave very poor results; as soon as the valve is opened the water moistens the carbide excessively, which causes an instantaneous overproduction of gas, which escapes past the stream of water. This escape of gas lasts for some time before an equilibrium is established. With this type of generators it often happens that there is a continual overproduction of gas, owing to the vibration produced by the unevenness of the road, with the result that the carbide is dissolved in a short time.

A modified form of this apparatus, with a carbide retainer closed below and with the water admitted through a small opening of about 2 millimetres (.08 inch diameter), gave, on the contrary, very satisfactory results, and was highly recommended by the jury on account of its regularity. The carbide is moistened very slowly and an equilibrium is produced between the gas pressure and the water without fluctuations, even if the valve is closed after the device has been in operation for a while.

Two other very interesting generators were based on the principle of communicating vessels. If it had not been for the complication of the interior tubes, which would necessitate the return of the device to the manufacturer in case of leakage, the jury certainly would have given awards to these.

Many other types of generators connected to searchlights were entered, some with sight lenses and others with carbide contained in gauze boxes placed horizontally. Most of them were too complicated and some considered unsafe, owing to the fact of there being a joint below the level of the burner tip.

The acetylithe burners did not prove satisfactory, as they are not reliable in operation when the car is standing, the glucose with which the carbide is covered not dissolving when the device is at rest. Besides, the light is not as white as the light from pure carbide.

The searchlights were mostly provided with parabolic reflectors, some shaped after the most refined scientific principles. A certain number employed lenses for further concentrating the luminous rays. The most remarkable was one with a silvered glass, a masterpiece of mirror construction, but of a rather high price.

On the whole the searchlights presented were of very tasteful design and did not in the least detract from the appearance of the vehicle; some, however, were clumsy and of unsightly form. The acetylene generators were in general heavy and unstable, and their mode of attachment was faulty. All the devices were well built, of yellow brass, ornamented and polished.

Among the entries was noted one electric searchlight, but it was thought to be still rather impracticable, particularly as the use of accumulators as source of current was impossible.

One of the kerosene lamps entered was provided with two glasses, nearly an inch apart; the inner one of the two glasses, of course, reaches a high temperature, while the other one remains cool, being fanned by the air currents stirred up by the vehicle's motion. The layer of air between the two glasses prevents the breaking of either.

In the class costing up to 200 francs first place was secured by a Boas Rodrigues searchlight with lens. The photometric tests showed the luminous intensity to be 6.8 times that of the standard

light; ordinary newspaper print could be read at a distance of 581 metres (194 feet). After twelve hours of extinction and two hours' previous burning the lamp could be started in two minutes.

In the class selling at between 101 and 200 francs first place was secured by a Monin projector searchlight; photometric tests, 12.1; road test, 744 metres; lighting was instantaneous after twelve hours' extinction and two hours' previous burning.

In the class selling above 200 francs a Zanardini searchlight took first place; photometric test, 13; road test, 91.3; could be lighted instantaneously after twelve hours' extinction and two hours' previous burning.

Municipal Motor Omnibuses in Eastbourne, England.

Eastbourne was the first corporation in the United Kingdom to obtain powers for running a motor omnibus service, and the experiment is reported to have proved very satisfactory so far. Eastbourne is something of a fashionable resort; it has no street cars, and when the increasing traffic required better transit facilities between the centre of the city and the suburbs street cars were proposed, but the plan met with much objection. It was then decided to try motor omnibuses, and after some obstruction in the House of Commons a bill was passed authorizing the corporation to operate a motor omnibus service.

Two Milnes-Daimler gasoline omnibuses were first put in service about three months ago. Each one carries sixteen passengers—fourteen inside and two outside. When the outside end seat contains only one lady passenger it gives the casual visitor the impression that Eastbourne's lady conductors are very stylish and attractive officials; but that is a detail.

One omnibus runs from the station through the principal thoroughfares of the western town out to Beachy Head, returning by another populous route; the other runs from the eastern town to the cemetery, in the northwest, connecting with the other omnibuses at the station. Penny stage fares are charged on both lines.

So far the corporation's motor omnibuses have earned about £4 a day each, and the total cost of running, maintenance, depreciation, etc., is about £2 10s. a day. In every other way, as well as merely financially, the authorities are said to be abundantly pleased with the success of their experiment.

Motor Bicycles for the German Army.

The Experimental Department of the German Army has been making experiments with motor bicycles in their application to military purposes for over a year, and the army administration has now decided to definitely introduce motor bicycles in considerable numbers. Specifica-

tions have been drawn up for the supply of the machines, according to which the motor bicycles will be definitely accepted by the Experimental Department only after a satisfactory test of 1,500 kilometres (940 miles). Improvements which may seem necessary at the end of these tests must be made by the manufacturer free of charge. The operating expenses during the trial are borne by the army authorities; the cost of maintenance by the manufacturers, in case maintenance expenses are dependent upon faulty material or workmanship. Any parts worn out during the trials must be replaced free of cost by the manufacturers, who also assume a half year's guarantee.

The following are the specifications referred to:

The motor bicycle must be capable of carrying a skilled rider, weighing about 175 pounds, with complete equipment, at least 125 miles per day over well surfaced roads. An increase of the daily mileage to 185 miles must be possible under favorable conditions of road and weather.

The motor must be sufficiently powerful to admit of 10 per cent. grades being ascended without pedaling, under favorable conditions. For use in mountainous districts a second gear must be provided, in the form of a smaller pulley. Riding on down grades up to 16 per cent. must be thoroughly safe.

The maximum speed on level roads must be about 25 miles per hour.

The motor bicycle must be capable of leaving the road at suitable places, and of being driven over sloughs, meadows and land under cultivation, as well as on unpaved roads, and must be adapted for use on slippery road surfaces. It is also desirable that ice and snow to a depth of 4 inches should not prevent the use of the machine.

The motor bicycle must be of such solid construction that riding on uneven, rutty roads may be accomplished with perfect safety.

The supply of the motor fuel (gasoline of .680 specific gravity) must suffice for a distance of 185 miles, even under the most unfavorable conditions. The possibility of using gasoline of .710 specific gravity must be guaranteed.

The motor bicycle must be built long and low.

A liberal supply of tools and spare parts must be furnished with the machines.

When the order is placed it must be stated whether front or rear drive is employed.

The motor must be a single cylinder, four cycle, air cooled, and of about 2 horse power.

The admission and exhaust valves must be of equal dimensions and readily removable; the former may be either automatic or mechanically operated.

Ignition is to be electric, and if possible with mechanical generation of current. Otherwise dry batteries must be used, with

induction coil and buzzer. The spark plug should be fixed to the cylinder head, or at least so that accidental damaging is impossible. The wire connections must be thoroughly insulated. Speed control of the motor by variation of the period of ignition is desirable.

The carburetor must operate reliably under all weather conditions. Throttling of the charge or of the exhaust is optional. A compression cock must be provided to facilitate starting the motor.

The gasoline tank must be provided with a device to indicate the amount of fuel contained in it; besides it must be of a construction preventing the possibility of explosion.

The driving connection between the motor and the wheel must be thoroughly reliable and consist of a rough and elastic belt.

For lubricating purposes an oil reservoir and oil pump must be fitted; the supply must be sufficient for a run of 375 miles, and adjustment of the lubrication must be possible while the machine is running.

All parts of the motor must be readily accessible, and all nuts must be secured by lock washers and split pins.

The handle bar is to be of the type used for military bicycles, but must be considerably stronger. The handles are to be of horn, and of durable construction.

Both front and rear wheels are to be of 26 inches diameter. The ball bearings must be provided with ball retainers.

Outer covers and air tubes (26x2½ inches) must be guaranteed for a distance of 5,000 kilometres, or a period of six months from the date of delivery.

A simple coaster brake fully protected against dust must be fitted.

Club Doesn't Want to Be Mentioned.

The organ of the A. C. G. B. I. reports a hearing by the club committee on two cases of furious driving. One of the offenders, a member of the club, apologized for having in the heat of the moment given the club address, and the committee reminds members that they must not under any circumstances give the club address in connection with charges of furious driving.

Mr. Spencer, of Southend-on-Sea, England, recently offered a 1½ horse power motor bicycle for sale, and in due course a gentleman arrived to examine it with a view to purchase. He of course wished to have a trial, and, though to all appearances a novice, was allowed to mount. He started off for a little run in the neighborhood, but proved so skillful a driver that Mr. Spencer has never come up with him again.

The House of Lords of the British Parliament, on July 17, by 59 votes to 12, decided that a test of skill should not be required before licensing. An amendment was inserted requiring that amateurs be

well as professional drivers should be licensed, and it was decided that no one under the age of sixteen years should receive a certificate.

Dugald Clerk, M. Inst. C. E., is preparing a paper on "The Governing of Gas in Gasoline Engines," to be read before the A. C. G. B. I. next winter.

The Irish Department of Agriculture, through Mr. Wyndham, will make a series of experiments as to the supplementing or supplanting of gasoline by means of alcohol produced from beet root and potato.

The Jenatry Electrical Works at Brussels, Belgium, were destroyed by fire on July 15. These works belonged to the brother of Camille Jenatry, who won the Gordon Bennett Cup race.

The English motor car bill is meeting the most strenuous opposition in the House of Commons, and it appears practically certain that before it is passed a definite speed limit will be inserted, probably 25 miles per hour.

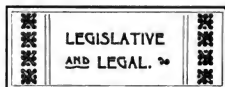
Punch prints a caricature showing Arthur B. H. "doing his three months" and Joe Ch-m-b-r-l-n looking in and remarking: "Hallo, Arthur, got a 'settled conviction' at last?" The caricature is captioned, "What Might Happen Under the Proposed Motor Car Act."

The Midland Automobile Club held a hill climbing test on the Sunning Hill, 10 miles from Stratford-on-Avon, on July 25. Of thirty entries nineteen started. One American car, a Cadillac, competed, and although it had less horse power than any of the other cars it secured twelfth place.

An automobile crossing the Rhine by the Wettstein Bridge swerved aside to avoid a tramcar, broke down the parapet and fell into the river. Boatmen rescued the two occupants, one of whom was slightly injured. The strong current carried away the car, which has not since been seen.

Baron Henri de Rothschild appeared before the police court in Paris on August 5, on the charge of automobile scorching. His defense was that he had a permit from the Ministry of the Interior as a doctor allowing him to disregard the police regulations. The case was postponed until August 24.

A suit brought by the publisher of *La Locomotion Automobile* against the publishers of *La Locomotion*, to prevent the latter from using the title "La Locomotion," was decided recently in favor of the plaintiff; defendant was held to change the title within fourteen days, and to pay the cost of the proceedings, and a fine of 100 francs will be imposed for every violation of this decree.



New York Numbering Law Unconstitutional.

The Court of Special Sessions of the First Division of the City of New York on August 7 declared that section of the Bailey law requiring the numbering of cars unconstitutional. This section, as is well known, exempts manufacturers and dealers from carrying numbers. The conclusion of the judges' opinion is as follows:

"The exception in behalf of the manufacturers and dealers can refer only to the use by them of automobiles upon the highway for purposes other than their own private use or hire. 'Own private use' undoubtedly refers to a use not connected with the display, test or demonstration of the automobile for purposes of manufacture, purchase or sale.

"By the enactment of this exception a situation was created whereby one class of citizens owning automobiles can be readily identified, and another class of owners cannot be identified by the same means. For instance, a citizen owning an automobile and operating the same for his enjoyment may be readily identified by statutory means if he violates the speed provisions of the law or any ordinance, while the dealer who is demonstrating the qualities of his machine may escape under like circumstances, because of the lack of statutory means of identification; and as a consequence a private owner may be subjected to severe penalties which the manufacturer or dealer may readily escape. Thus the statute discriminates between persons of the same class, to wit, persons operating the same kind of vehicles upon the highway. This is a discrimination which clearly offends the provisions of the Fourteenth Amendment of the Federal Constitution.

"It therefore follows that the requirements of the law in regard to filing a statement, registration and certification, and the display of the number of the certificate are unconstitutional, in so far as they are applicable to owners of automobiles and motor vehicles, and as under our construction of the statute the defendant was not required to obtain a certificate he was not, of course, required to display the number of his certificate on the back of the automobile. The provisions of the statute in relation to the registration and the certification of mechanics and employees are not before us for determination and we do not pass upon the same.

"It is suggested by the learned district attorney that this court should not pass upon the constitutionality of the statute we discuss.

"It is undoubtedly the policy of the lower

courts not to pass upon the constitutionality of a statute where there is no means of review, and had the defendant gone to trial and had this question arisen upon a motion in arrest of judgment, this court in pursuance of well settled policy would not have considered the constitutional question; but as an appeal lies from the allowance of a demurrer, the people have full opportunity to test the question involved, and in any event the grand jury has the power to indict the defendant as for a misdemeanor—so that there are sufficient opportunities whereby the determination of this court may be reviewed.

"In determining whether to consider the constitutionality of the provisions of this statute which are here attacked, the court is bound to take into consideration the actual situation presented.

"It is clearly the duty of every police officer to arrest any person who fails to display the number on the automobile where required by this statute. If the person arrested is a dealer or manufacturer not operating the machine for his own private use or for hire, the police officer cannot perform any judicial function and determine whether the arrested person is telling the truth or not, and thus the persons who are excepted by the statute and who would be ultimately acquitted are subjected to arrest and imprisonment, with the consequent violation of their rights through no fault of the police officer. Such a condition of affairs, where a statute is deemed to be unconstitutional requires immediate remedy, and our clear duty is to determine whether the statute is constitutional or not, rather than to formally disallow the demurrer and permit the defendant to appeal, with the consequent confusion and delay that such a course would entail."

Suspension of License Sustained.

In the case of the People vs. W. H. Ellis, in the Court of Special Sessions of the First Division of New York, counsel for the defense objected to the court passing sentence upon defendant and suspending his license, claiming the section of the law under which sentence was imposed to be unconstitutional. The court overruled the objection, but allowed that the constitutionality of the section was questionable:

"The learned counsel for the defense has presented some very grave objections to the constitutionality of this provision of the law as violative of Article I, Section 6, of the Constitution of the State of New York. In this case, however, should we fail to impose the sentence required by the statute, there would be no means of testing our determination on appeal."

Farmers in several counties of Northern Indiana are organizing an association for the purpose of fighting reckless automobile drivers.

State officials of New Jersey are regretting that they did not make the State fee for automobile registration \$5, instead of

\$1. Thirty-four hundred licenses so far have been issued, and it is claimed that \$5 each might just as well have been secured.

Several bills regulating the use of automobiles are pending before the State and county governing bodies in Georgia.

The proposed automobile ordinance for Louisville, Ky., is opposed by the local club—a 6 mile speed limit being the chief objection.

The police department of Minneapolis, Minn., is asking for a local automobile ordinance, claiming that the State regulations are inadequate.

The Buffalo Automobile Club is still having trouble with the automobile regulations of Canada. Several drivers are under heavy bonds for the payment of duties.

Julian Teza, who was arrested on July 8 for riding a motor cycle without license, was discharged on August 7 on a demurrer by the Court of Special Sessions, First District of New York.

A warrant is said to have been issued for the arrest of Orlando F. Weber, an automobile dealer of Milwaukee, Wis., who is charged with having violated the city's speed ordinance.

Earl D. Luce, who is said to be the first automobilist arrested in Minneapolis for driving his machine faster than the law allows, thereby causing a runaway, in which five persons were injured, has pleaded not guilty.

Upon legal advice that the complaint against Mr. Unger for violating the New Jersey speed law was faulty, the town officers of Fanwood have consented to the dismissal of the case, but it is said that a new complaint will be drawn up.

The City Clerk of Colorado Springs, Col., writes that the automobile ordinance which has been pending before the City Council for two months will be passed at the next meeting, August 17. The ordinance provides for rates of speed as follows: Five miles an hour on turning street corners or at street intersections; 6 miles an hour within the fire limits, and to miles an hour outside of the fire limits and within the city limits; also, the usual regulations in regard to brakes, horns, bells or other signal lights, stopping when signalled, and the display of license numbers, the annual fee for which is fixed at \$5. Opening of mufflers within the city limits, except where necessary to ascend grades is forbidden. Violations are punishable with fines of not less than \$400 nor more than \$200 for the first offense; not less than \$300 nor more than \$300 for each subsequent offense, and also commitment to the city jail for not exceeding ninety days, until both fine and costs shall have been fully paid. The ordinance takes effect upon its passage. The city clerk states that the anti-automobile feeling in that city is very strong at present owing to two recent serious accidents, but that no arrest has yet been made, and that the results of the injuries are being first awaited by the officers.



The completion is announced of the De Loura Auto Company's new factory at Fort Dodge, Ia.

Work is actively under way on the new buildings for the Packard Motor Car Company, at Detroit, Mich.

The Geo. N. Pierce Company have increased the size of the motors in their motorettes and now rate them at 8 instead of 6½ horse power.

The International Power Vehicle Company, of Stamford, Conn., has undertaken a \$250,000 mortgage bond issue for the purpose of extending its plant.

The Wright Optical Company, of Northampton, inform us that they have had tire treads renewed by the Hartford Rubber Works Company. This in answer to a recent inquiry in our columns.

Phineas Jones & Co., the well known vehicle wheel builders, of Newark, N. J., announce that Phineas Jones, Jr., and H. Percy Jones, sons of the senior member, have been taken into partnership.

Report has it that Tyndall Palmer, of New York, is in correspondence with Mayor Head, of Nashville, Tenn., with the view of securing a site there for an automobile factory to cater to Southern trade.

W. A. Molter, until recently in the employ of the West End Automobile Palace, has opened a large automobile station in New York city, extending through from 206 West Sixty-fifth street to 205 West Sixty-fourth street.

The Post & Lester Company have renewed their contract with Volier & Sons, of Paris, as American agents of their auto horns. These horns have non-corrosive, vibratory brass reeds, specially vulcanized rubber bulbs and a bell of spun brass.

G. L. Herz, formerly of Puncaple street, Brooklyn, has associated himself with G. Remo, under the firm name of Herz & Co. They have removed to 55 Grand street, New York city, where they occupy two floors for the manufacture of spark plugs, etc.

The labor unions are again making trouble in the automobile industry. The business agent of the International Association of Machinists, at Indianapolis, a short time ago received notice from Syracuse that two "non-union" automobiles had been shipped to his city and was instructed to notify the firms to which they had been sent.

A suit has been brought by James W. Gladstone, of Orange, N. J., against the Edison Manufacturing Company for alleged infringement of certain patent rights belonging to Gladstone. The patent on which the suit hinges was granted to Felix de Lalande, of Paris, in 1892 and was assigned to William M. Offey, of Washing-

ton, who transferred it to Gladstone. An infringement suit had previously been brought by the Edison Manufacturing Company against Gladstone.

New Britain, Conn., automobilists are considering the organization of a club.

It is reported that George Gulliford will open an automobile factory at Findlay, Ohio.

An automobile engine and hose wagon are being tested by the Louisville (Ky.) Fire Department.

Statistics of automobiles as a factor in farm life are being compiled by the Department of Agriculture.

An automobile meet will be held at Kokomo, Ind., on August 20. There will be six races, and the purses will be \$1,000 each.

The Baker Automobile Company, of Middletown, Conn., are said to expect to be able to put out their first phaeton about October 1.

Lueth Brothers, of Kankakee, Ill., it is reported, will go into the business of assembling automobiles. They will make their own bodies.

The Great Falls Transportation and Amusement Company has been organized to run a line of automobiles between Cabin John Bridge and Great Falls.

Clarence A. Putnam, of Salem, Mass., has purchased the Gem Theatre property in that city and will remodel it for an automobile station and sporting goods store.

Park Densmore, former president of the Foster Automobile Company, of Rochester, N. Y., is still in hiding. The involved concern's obligations are now stated at \$30,000.

The Berg Automobile Company, of Cleveland, Ohio, has liquidated all its indebtedness, and its tools and patterns have been conveyed to the Federal Manufacturing Company. They are said to be negotiating to transfer them to the Studebaker Brothers Manufacturing Company, who contemplate adding a gasoline car to their automobile line.

An automobile race over a course, probably about 50 miles long, is being vigorously promoted in Saratoga, N. Y. A trophy to be worth \$10,000 is proposed, and Foxhall Keene, W. K. Vanderbilt, Jr., J. A. Drake, E. R. Thomas, Charlie Gates, Harry Payne Whitney, Jesse Lewisohn, W. H. Barker, William Fleischmann and Albert C. Bostwick are among the prospective entries.

By a contract closed August 5 the Winston Motor Car Company, of Cleveland, Ohio, has secured the exclusive right to Barney Oldfield's services as track and road racing representative. This deal is said to have been pending ever since Oldfield made his new records at the Empire City track. Oldfield agrees to make onslaughts on all existing records, and may be sent to Europe next year. It is said that John Sinclair, the French racing man, who recently made a new to mile record for machines under 1,800 pounds, proposes to dispute championship honors with Oldfield.

Rules of the New York-Pittsburg Endurance Contest.

1. SCOPE OF THE CONTEST.

The contest shall consist of: (a) Run from New York to Pittsburg, Pa., over a course whose details shall be announced one month in advance of the contest. (b) Brake test. (c) Hill climbing test. (d) Test of weight carrying capacity. (e) Test of condition of car at finish. For each of these divisions points shall be awarded as hereinafter provided.

2. DATES OF THE CONTEST.

The dates of the various sections of the contest shall be as follows, regardless of weather:

October 6—9 a. m. Weighing and examination of cars.

October 7—7 a. m. Start of the run.

October 14—Finish of the run.

October 15—7 to 9 a. m. Brake and hill climbing tests.

October 16 and following days—Examination of cars.

3. POINTS.

The run, maximum.....	3,000
Brake test, maximum.....	250
Hill climbing, maximum.....	250
Weight carrying capacity, maximum.....	1,000
Condition at finish, maximum.....	1,500

Possible points obtainable..... 6,000

4. ELIGIBILITY.

The contest shall be open to all classes of self propelled vehicles, subject only to the following restrictions:

They must be so constructed that at least two passengers can be carried, seated side side.

They must be provided with efficient brakes, independent of the engine, and a reversing device.

They must be regularly manufactured and offered for sale to the public.

They must be fully equipped as specified in the entry blank and no change in equipment, or any deviation from the description furnished at the time of entry, shall be permitted in any feature of the contest.

They must be equipped with all the seats usually carried.

5. CLASSIFICATION.

Vehicles shall be classified according to price, as follows:

Class A. \$1,000 and less.

" B. 1,501 to \$1,500 inclusive.

" C. 1,501 " 2,000 "

" D. 2,001 " 2,500 "

" E. 2,501 " 3,000 "

" F. 3,001 " 3,500 "

" G. over \$3,500.

6. WEIGHING AND EXAMINATION.

Weighing, examination and sealing of cars shall commence at 9 a. m. Each contestant shall report to the official weigher with his car equipped exactly as it will compete in all sections of the test. It shall be necessary for the car to conform, in all respects, to the description given at the time

of entry. The official weigher, having made a record of the weight of the car, shall attach a seal. Without the seal, no car shall be allowed to start. Each contestant shall obtain from the weigher a badge for himself and for one passenger, if one be carried, said badge or badges bearing the number of his car, which badge or badges shall be worn conspicuously during the contest, two banners and two numbers, which must be attached to the car.

Ballast, if any be carried, shall also be weighed and sealed.

7. THE RUN.

The run shall start at 7 a. m. on October 7. Each contestant shall be credited at the entry with 3,000 points, representing approximately the number of minutes required to cover the full distance at legal speed. From this number shall be deducted one point for each minute or portion thereof a car is at rest, no matter what the cause, except as hereinafter specified.

Should it be necessary for a car to stop while nearing an official garage, by reason of pressure of cars ahead and for no other reason, the fact shall be noted by the observer, but there shall be no forfeiture of points. The cars shall fall in line on the right side of the road, no car overlapping the one ahead.

There shall be no penalization for unavoidable stops to avoid frightening horses, traffic demands of nature, to render assistance in case of accident to other cars or drivers of horses, or to light lamps. In all these cases, motors shall be allowed to be stopped, provided there shall be no flagrant violation of the rules.

To secure a perfect score, it shall be necessary for a car to make the entire journey under its own power. If at any time a car shall proceed without any part of its load, a record of the time such load is absent shall be taken by the observer and the car shall be penalized as if stopped. Should a car be towed or pushed, the time occupied in such towing or pushing shall be considered as a stop.

One stop, not to exceed one hour, shall be permitted for lunch without penalization, the observer, meanwhile, never to be out of sight of the car.

8. BRAKE TESTS.

Brake and hill climbing tests shall commence at 9 a. m. on October 15. Each contestant shall report to the official measurer, with his car equipped exactly as it competed in the run, and with its extra parts, supplies and ballast on board.

To secure a perfect record in the brake test a car shall demonstrate to the satisfaction of the referee its ability to stop within — feet in a speed of — miles an hour. A perfect record shall entitle a contestant to 250 points. For each foot or fraction thereof in excess of the said — feet required to bring a car to a standstill — points shall be deducted.

In making the stop a car shall not be

permitted to deviate more than three feet on either side from the direct course in which it has been traveling.

To secure a perfect score in the hill climbing tests a car shall demonstrate to the satisfaction of the referee its ability to climb a distance of — feet in — minutes on an average grade of — per cent, flying start of 200 feet being permitted; to back 50 feet, come to a standstill and then move forward 50 feet, all on an average grade of — per cent. A perfect score shall entitle a contestant to 250 points. The following penalties shall be enforced: For each stop, 20 points; for each five seconds or portion thereof in excess of the said — minutes required to complete the distance, 1 point; for failure to back the required 50 feet, 50 points; for failure to start on the grade and complete the required 50 feet, 50 points.

No change of sprockets or gears for hill climbing or for any other purpose, except repair, shall be permitted. In case of replacement the sprocket must be of the same size.

9. WEIGHT CARRYING CAPACITY.

Except that each car must carry an observer, the number of passengers shall be optional. A record shall be made of the weight carried either in passengers, including the operator and observer, or ballast, exclusive of personal baggage and extra parts. At the finish of the run, each car which shall have carried a load equal to 30 per cent. or more of the weight of the car, shall be credited with 1,000 points, and cars whose loads shall have been less than 30 per cent. in proportion. Operators, passengers and observers shall be assumed to weigh 150 pounds apiece, but there shall be no obvious variation from that weight. Vehicles shall be equipped with all of the seats usually carried. One passenger only (hereinafter described as the mechanic) shall be permitted to render assistance in the matter of repairs, but only to the car on which he is actually traveling and in the presence of the observer.

10. CONDITION AT FINISH.

Immediately on completion of the run, hill climbing and brake test, each car shall be placed in the official garage in exactly the same condition as it finishes and there left for official inspection. The inspection shall be made by a board of examiners consisting of not less than three disinterested engineers, whose duty it shall be to make a record, based on the evidence before them and the reports of the observers, of the condition of each car. The board shall note especially replacements, and the character of the assistance rendered the operator in making repairs. The board shall also take cognizance of the cost of parts replaced in proportion to the cost of the car.

The board of examiners shall accept as the standard of excellence the car which it finds to have been least affected by the test, and shall be entitled to discard as not

entitled to any award any and all cars which, in its judgment, are not in fit and safe condition for continued use without extensive repairs. The necessity of replacing tires shall not be considered an extensive repair in this connection.

The board shall divide the cars into as many classes as it shall consider necessary and shall make a written report of the condition of each car, with special reference to such deterioration as it seems to have suffered as a result of the test.

The following points shall be awarded, according to the findings of the board of examiners: To vehicles of the first class, 1,500; second class, 1,250; third class, 1,000; fourth class, 900; fifth class, 800; sixth class, 700; seventh class, 600; eighth class, 500; ninth class, 400; tenth class, 300.

(Note.—This examination will occupy several days. Arrangements must be made to leave the cars at Pittsburgh until the completion of the report. The cars will be in charge of a watchman, but insurance, if desired, must be secured by the owners.)

At the close of the test each contestant shall furnish the board of examiners a list of prices of parts needed for replacement during the test, at which prices they shall guarantee to supply the said parts to owners of their machines at any time within six months. In the event that the contestant is not a manufacturer he must furnish a list with the maker's guarantee attached.

11. START OF THE RUN.

Operators shall report to the starter not later than 7 a. m. on October 7. The cars shall be started 30 seconds apart, as nearly as possible in the order of their arrival on October 6. After the first morning no restriction shall be placed on the time a car may start within the hours the garage is open (6 a. m. until noon), except that the hour shall not be earlier than 7 a. m., without the consent of the observer.

12. ENTRIES.

Entries shall be made upon blanks supplied by the association, which blanks shall be filled out by the entrant in every detail and show the following: Name of machine; name of manufacturer; place of manufacture; retail selling price; weight of vehicle with tanks filled and complete equipment; water and gasoline capacity; number of passengers ordinarily carried; number of cylinders; bore and stroke of engine; arrangement and location of engine; whether two or four cycle; revolutions per minute at 20 miles per hour; size of wheels; wheel base; form of ignition; make, size and retail price of tires and whether single or double tube; list of special lubricating and other devices included in retail selling price.

The entry fee shall be \$25 for each vehicle and shall accompany the entry. No entry shall be received unless accompanied by the fee. Each entrant shall also furnish one official observer, whose expenses he must defray throughout the test, for each

of his entries, and shall be responsible for the performance by said observer or observers of the duties hereinafter prescribed. The name and address of the operator and observer shall be given at the time of entry, but a change may be made if necessary at any time before 6 p. m. on September 29.

In the event of a vehicle being disqualified or failing to take part in the contest, the entry fee shall be retained by the association.

There shall be no limit to the number of vehicles which may be entered by any manufacturer, agent or owner.

The association reserves the right to refuse any entry without assigning a reason.

Entries shall be made by mail or in person at the office of the association up to 4 o'clock p. m. on September 22. An entry tendered either in person or by mail or telegraph later than the time herein set for the closing of entries, or unaccompanied by the entry fee and by all of the details asked for in the entry blank shall be rejected.

By his signature to the entry blank a contestant shall acknowledge that he is acquainted with and fully understands the rules of the contest, and that he agrees to abide thereby.

13. OBSERVERS.

Each competing car shall carry an official observer, whose duty it shall be to act strictly in accordance with these rules and those hereinafter provided for his guidance. Observers will be changed daily and under no circumstances shall an observer be permitted to ride upon a car made, owned or for the time being controlled by the entrant by whom he is nominated.

It shall be permissible for the operator to call upon the observer to render any reasonable assistance within his power only while the vehicle is actually at rest.

14. NUMBERS.

Each competing car shall have securely and conspicuously attached thereto, on both front and rear, or both sides, an official letter and number corresponding with that given in the catalogue, which numbers shall be obtained and applied immediately after weighing and sealing on October 6. Cars shall be numbered in the order of receipt of entry.

15. GARAGES.

An official garage shall be established at each night stop, at which each car shall be placed in charge of the superintendent of garages. After entering the garage, the operator may do nothing more to his car, without penalization, than shut off the gasoline, water, current and lubrication, and fill tanks.

The site of a garage will be designated by a red flag, with the word "garage" prominently printed thereon. A green flag shall be placed a quarter of a mile in advance of each garage.

No car with a lighted burner or lamp shall be permitted to enter a garage, nor

shall smoking or the use of fire for any purpose whatsoever be permitted therein.

Contestants, mechanics and observers shall be required to exhibit their badges to the superintendent of garages or his assistant in charge of the entrance in order to gain admittance.

It shall be permissible for an operator or mechanic, or either of them, to enter a garage when accompanied by their observer, but not otherwise. An observer shall not be required to remain in a garage more than fifteen minutes after arrival.

16. OBSERVANCE OF LAW.

Operators shall conform in all respects to the laws of the States in which the contest occurs, to the rules and regulations of local officials and to the rules of the road. Infractions of the law shall be carefully noted and recorded by observers. Willful disobedience of this rule shall result in summary disqualification.

Running with open mufflers shall be penalized at the rate of one point per minute or fraction thereof.

17. TIME AND SPEED.

No cognizance shall be taken of time or speed unless it shall be shown by an observer that there has been willful infraction of the law, the penalty for which shall be immediate disqualification.

18. TIRES.

It shall be compulsory that the same make and style of tire shall be used throughout the journey. In case of tire deflation, it shall be compulsory to stop and make a repair unless the damage shall be such that it cannot be repaired by the use of ordinary roadside facilities, which fact shall be duly reported by the observer.

It shall be permissible to replace, instead of repairing, inner tubes, but these shall be charged as an item of expense of repair by the board of examiners unless repaired and used before the end of the test.

19. OFFICERS.

The officials of the test shall be:

A board of examiners of three members.

A referee.

A starter.

A timer, a measurer, a weigher and a superintendent of garages, all with the necessary assistants.

A superintendent of observers.

An observer for each competing car.

[Rules 20 to 28 specify the duties of the various officers; they are here omitted.—Ed.]

29. CERTIFICATES.

Certificates shall be awarded according to the following plan:

Each certificate shall set forth the name, price, name of maker, entrant, weight of car, number of passengers carried; the make, size and retail price of tires used, and whether single or double tube and the number of points scored for each feature of the contests.

That vehicle in each class which secures

the highest number of points shall be accepted as the standard of excellence in its class and shall be rated 100 per cent.; all cars whose scores are between 91 and 100 per cent. inclusive, shall receive first class certificates; those whose scores are between 81 and 90 per cent. inclusive, second class certificates; those whose scores are between 71 and 80 per cent. inclusive, third class certificates.

30. OFFICIAL REPORT.

There shall be published, in addition to the issuance of certificates, an official report of the performance of each car which finishes the run, which report shall contain the details shown on the certificate, the reports of observers, the total cost of repairs, and the report of the board of examiners.

31. REPAIRS.

Under no circumstances shall an operator or any other person make or attempt to make any repair or replacement or do any work upon a competing car in the absence of the official observer, nor shall it be permissible to call to his assistance any other than local repair shop facilities. The assistance of expert repairmen, traveling by train or otherwise, is strictly forbidden. No replacement shall be made, except of tires, except by such extra parts as are carried on the car or obtainable at local repair shops.

There shall be no restriction placed upon the quantity of extra parts or supplies a machine may carry.

32. ASSISTANCE OF OBSERVERS.

It shall be the duty of each operator to furnish every facility necessary to the preparation by the observer of a complete report, in strict accordance with these rules and those laid down for the observers' guidance, which are a part hereof, and equally binding on contestants.

33. THE ROUTE.

There shall be no deviation from the course under any pretext. Should local conditions render any change of route described in the official program necessary, due notice of the fact shall be given to contestants before the start on that particular portion of the journey.

34. REPAIRS WHILE IN MOTION.

No filling of tanks or repair shall be permitted while a car is in motion.

35. BANNERS.

Each car shall be required to carry two banners, bearing its name, which banners will be supplied by the association. No advertising matter, except the banners provided by the association, shall be attached to any competing car.

36. TEST OF ENGINES.

After the trial, the bore and stroke of the engine of any car may be checked by the board of examiners upon the written request of three operators, and if found incorrect, the penalty shall be disqualification.

37. CHANGE OF OPERATORS.

It shall be permissible for the operator of a vehicle to be changed at the end of any day's run, or at any time in case of indisposition or accident.

38. STARTING HOUR.

Operators shall record with the superintendent of garages each evening the hour at which they desire to start next morning, so that the observers may be fully informed.

(Note.—The route will be carefully and thoroughly marked by means of arrows or other suitable signs of confetti liberally distributed by a pilot car. Turnings will be indicated by liberal supplies of confetti, and that there may be no misunderstanding smaller supplies will be distributed on straightaway roads at intervals not to exceed 200 yards.)

39. SUPPLIES AT GARAGES.

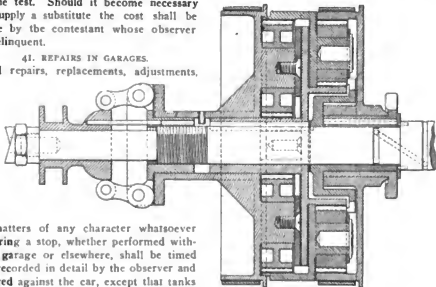
The association will make arrangements for an adequate supply of gasoline and water at each garage.

40. SUBSTITUTE FOR OBSERVERS.

Competitors failing to supply official observers shall not be permitted to take part in the test. Should it become necessary to supply a substitute the cost shall be borne by the contestant whose observer is delinquent.

41. REPAIRS IN GARAGES.

All repairs, replacements, adjustments,



No. 734,891.

or matters of any character whatsoever requiring a stop, whether performed within a garage or elsewhere, shall be timed and recorded in detail by the observer and charged against the car, except that tanks may be filled at each night's stopping place without penalization.

42. DISQUALIFICATION.

Disqualification means that on notice of disqualification being served on the operator a car shall cease to take part in the test and shall not receive a certificate or be mentioned in the record.

43. DISPUTES AND CHARGES.

Any dispute concerning the interpretation of the rules shall be subject to the decision of the association, whose decision shall be final. The association reserves the right to alter or amend these rules in such manner as may be deemed expedient at any time prior to the start of the contest.

New Incorporations.

According to an exchange from Farmington, Ill., the Cluts Manufacturing Company, of "Cuba," has been incorporated, with a capital of \$25,000.

The Michigan Automobile and Carriage Body Company, of Detroit, Mich., has been incorporated with a capital of \$10,000. The officers are: James H. Howick, president and manager, and M. W. Morvitt, secretary.

PATENTS...



MOTOR VEHICLE

United States Patents.

734,891. Variable Speed Mechanism.—Harry A. Knox, of Springfield, Mass. July 28, 1903. Filed February 19, 1903.

This is a sun and planetary device giving two speeds forward and one reverse. Its peculiar feature is that the high speed friction clutch is a disk clutch and is arranged between the two epicyclic gear systems.

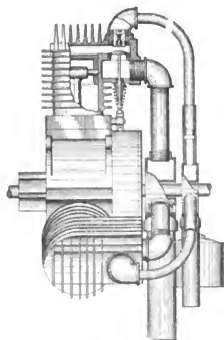
To the motor shaft is keyed a circular disk, which carries two spur pinions, one on each of its faces. To both sides of this disk are rotatably mounted spiders for carrying the planetary pinions. The spider shown on the right hand side of the draw-

ing has fixed to it the driving sprocket wheel, and upon its hub is mounted the hub of an internal spur gear with which the planetary pinions supported by this spider mesh. This spider is also provided with a lateral flange at its circumference, which flange is cut with internal gear teeth, with which engage the planetary pinions carried by the second spider. The gear also comprises two brake drums, to which brake bands may be applied, as shown in the drawing. When the brake band on the right is applied a slow forward movement is obtained, and the brake band on the left gives a slow reverse motion.

By means of a grooved sliding collar and a cam arrangement the two spiders carrying the planetary pinions can be forced against the friction surfaces of the disk between them, and thus the whole gear locked together.

735,035. Gas Engine.—William H. Jones, of Cambridge, Mass. July 28, 1903. Filed November 13, 1902.

The drawings show a three cylinder (radial), air cooled engine, and one of



No. 735-035.

the claims describes the invention as follows:

In a gas engine of the character described, a plurality of cylinders, each provided with an intake valve, an exhaust valve, a piston and connecting rod; the gear case; the crank shaft; a distributing box supported by the machine; a carburetor connected with the distributing box; a series of pipes connecting the distributing box with the intake valves of the several cylinders, each of said series comprising three pipes having slip joint connections whereby they may be separated and assembled; a collecting junction box supported by the machine and connecting with the main exhaust; a series of pipes connecting the junction box with the exhaust ports in the several cylinders, a portion of said series of pipes each comprising a pipe connected by a screw thread with the exhaust port and having a slip joint connection with the junction box, and one of

said series comprising a pipe which has screw thread connections with both the junction box and the exhaust port of its cylinder, substantially as and for the purpose set forth.

735,036. Igniter for Explosion Engines.—William H. Jones, of Cambridge, Mass. July 28, 1903. Filed November 13, 1902.

734,827. Rotary Explosive Engine. Robert Cumming, of Edinburgh, Scotland. July 28, 1903. Filed August 27, 1902.

735,021. Steam Generator.—F. E. and F. O. Stanley, of Newton, Mass. July 28, 1903. Filed December 6, 1898.

735,370. Motor Vehicle.—Robert H. Hessler, Indianapolis, Ind. August 4, 1903. Filed January 15, 1901.

735,373. Vehicle Tire.—Charles L. Henderson, Berlin, Canada. August 4, 1903. Filed October 20, 1902.

735,483. Hydrocarbon Mixer and Regulator for Engines.—George C. Eskholme, Brooklyn, N. Y. August 4, 1903. Filed June 8, 1902.

734,562. Valve Gear for Explosive Engines.—William H. Jones, of Cambridge, Mass. July 28, 1903. Filed November 3, 1902.

The invention relates to an engine with three radial cylinders. The valve gear comprises a central pinion on the crank shaft and three separate half speed gears, each of which operates a cam for opening one of the exhaust valves. A control lever is pivoted on the crank case, which, when turned around its pivot, first opens one of the exhaust valves, keeping it permanently open, and when moved still further opens a second, thus cutting down the power of the engine gradually.

734,740. Noise Muffler.—Philip Rauch, of Bradford, Pa. July 28, 1903. Filed August 28, 1902.

The muffler comprises a central main supply tube provided with a series of perforations in its wall, means for closing the outer end of the supply tube, a plurality of cup shaped muffler plates arranged in pairs on the supply tube, so as to form a series of interior muffling chambers communicating with the perforations, the muffler plates being provided with small exit passages and extension flanges on some of the muffler plates at their circumference, the flanges being also provided with small exit passages and forming an exterior series of muffling chambers communicating with and surrounding the interior series of chambers.

The exhaust gases pass from the cylinder to the central muffler pipe and pass

through the perforations to the separate chambers formed by the cup shaped castings. Owing to the small openings where the rough edges of the castings meet, the sound is considerably retarded. Passing into the second series of muffling chambers it is again considerably retarded by the small openings at the joint of the castings and, finally, after passing along the circuitous path constituting these chambers, indicated by the arrows, the exhaust gases leave the muffler.

735,628. Motor Bicycle.—Ole E. Waxel, West Oakland, Cal. August 4, 1903. Filed August 25, 1902.

735,075. Motor.—James L. Pilling and Robert J. Kruse, Port Huron, Mich. August 4, 1903. Filed January 19, 1903.

735,683. Vapor Burner. Elhu Thomson, Swampscott, Mass. August 4, 1903. Filed July 31, 1901.

735,684. Fluid Motor.—George White, Jersey City, N. J. August 4, 1903. Filed November 29, 1901.

The Packard Transcontinental Tour.

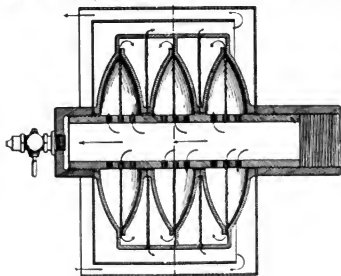
Messrs. Fetch and Krarup, who are crossing the continent in a Packard touring car, arrived at Adair, Ia., on August 3, after a day's trip over very muddy roads. The car had to be dug out of extremely bad spots on the road several times during the day. When arriving in Adair the wheels were solid disks of mud, and owing to the bad weather progress was naturally very slow.

Des Moines, the capital of Iowa, was reached on August 4, over roads which were alternately rough and muddy. The tourists were met by a delegation of Des Moines motorists about to miles out of the city. The bad weather continued, there being a continuous downpour on August 5, and the tourists remained at Des Moines, as a run on that day on the softened roads would have meant little mileage and much trouble.

A distance of 93 miles was covered on August 6 on roads drying, but still rough. No little trouble was experienced from horses, which seemed to be more skittish than farther west. On that day the exhaust valve was ground for the first time. The gasoline obtainable was of rather a poor quality.

On August 7 Wheatland, Ia., was reached, the tourists having spent two hours in Cedar Rapids, where they took lunch with George Henderson. At Mechanicsville they were arrested and fined, but it is not stated whether it was for speeding or on account of their travel stained appearance.

Chicago was reached on August 10. A delegation of the Chicago Automobile Club made a trip out to Maywood and welcomed the tourists with tooting of horns and congratulations. The trip was to be continued the next day, the tourists meanwhile remaining guests of the club.



No. 734-740.

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...EVERY WEDNESDAY...

Devoted to
Motor
Interests

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SPECIAL TOURING NUMBER.

For the issue of September 2, midway be-
tween the summer and the fall touring sea-
sons, we announce a special Touring Number,
confined strictly to the popular and most
enjoyable pastime. The recent growth of
automobile touring in the United States
warrants us in promising a treat for all who
are interested in the subject or who are sus-
ceptible to its charms and desirous of joining
the increasing body of American auto tour-
ists. One of the most interesting features of
this number, naturally, will be the depart-
ment set aside for the experiences of tourists
on the road in all parts of the United States
and in foreign countries. In order to make
this department as novel and helpful as pos-
sible the editor invites correspondence from
any of his readers who can contribute suit-
able touring experiences within the specified
time. Intrusive data or any amusing inci-
dents relating to touring are also desired.
It is our intention in our Touring Number to
provide solid information as well as an enter-
tainment, and to stimulate among the Ameri-
can public the love of nature and the most
convenient and modern mode of enjoying it—
automobile touring.

Government Revenue from Auto- mobiles.

Since automobile laws requiring licensing
and registration have gone into effect in a
number of Eastern States, the remark has
frequently been made that the motor vehi-
cle has become quite a source of revenue
for the authorities. The New York State
authorities have collected some \$7,000 from
automobilists of this and neighboring
States (as it would now seem, without any
constitutional right), the authorities of
New Jersey about half that sum, etc. The
license fees are, however, only a small part
of the share in the expenses of Government
borne by automobilists. All automobiles
are taxed as personal property, and the
amount raised in this way must now run
into millions annually. It is, of course, ab-
solutely impossible to make any definite
estimate of the amount of this tax, as the
rates vary all over the country, and the
assessments of personal property are not
always up to the real value.

A more definite item in the revenue de-
rived from automobiles is the duty on im-
ported cars. During the first three months

of this year the imports of automobiles and
parts were valued at over \$300,000, which,
with a duty of 45 per cent., delivered \$135,-
000 into the Government Treasury, or at
the rate of over a half million a year.

The Government, of course, also derives
revenue from automobiles in many indirect
ways, and it cannot be denied that the au-
tomobile industry and automobilists bear a
liberal share of the burdens of Government.

It appears that in some European coun-
tries, notably England, a good deal of
money flows into the public treasury as a
result of the arrest and fining of automobil-
ists. Let us hope that this source of reve-
nue may never assume appreciable pro-
portions in this country.

England's New Motor Law.

The "motor cars bill," which had been
pending in the British Parliament for some
weeks, became a law just before the
close of the session, and will regulate au-
tomobile traffic in Great Britain for three
years, from January 1 next. The bill met
many obstructions in the House of Com-
mons and the law as passed is much less
satisfactory to English automobilists than
the bill as first introduced, although it was
introduced by the Government and not by
or through automobilists. The latter hoped,
by conceding numbering and licensing and
an increase in the penalties for reckless
driving, to secure the entire removal of a
definite speed limit, but all they obtained
for these concessions was an increase of the
speed limit from 14 to 20 miles per hour.

When it is considered that some motor-
ists were even opposed to conceding num-
bering in return for the removal of the
speed limit it will be readily understood
that the final outcome of the legislation has
given rise to much dissatisfaction in some
quarters.

As compared with the law now in force,
the Light Locomotives act of 1886, the new
law raises the speed limit considerably, but
at the same time raises the fines for ex-

ceeding it. In addition it requires numbering of all cars and makes it an offense to allow the number to be obscured. Driving recklessly or negligently, at a speed and in a manner dangerous to the public, is an offense distinct from exceeding the speed limit, and is punished by double the fine, for first cases. Local authorities have the right to limit speed to 10 miles an hour in certain districts, but are required to place notices at the limits of such districts.

The new law has much in common with the Bailey law of New York State; it provides the same speed limit and the same fine for exceeding it (not to exceed \$50 for a first offense), although the Bailey law really does not provide the speed limit, but gives local authorities the right to fix a limit of not less than 20 miles per hour. The Bailey law has not been a very great hardship to New York automobilists, and their English brethren should therefore take heart. Those who have due consideration for other users of the highway will hardly come in conflict with the 20 mile limit, and the severe penalties will therefore have no terrors for them. But those who make it a practice to run at speeds determined only by the limitations of their motors, without regard to law or the cost of fines, will of course rebel at the increased cost of scorching.

The following figures will give an idea of conditions in England under the present law: During the third week in July there were 94 cases of furious driving brought up in the English courts. Fines were imposed in 50 cases, the average being £2 12s. (about \$13). In 65 cases the speed was given, the average figuring out to 23.35 miles per hour. For another week in July the figures are as follows: Total number of cases, 128; average amount of fine, £2 5s.; average speed, 21.73 miles.

Labor Union Movement Among Chauffeurs.

A possibility unpleasant to contemplate for that class of automobilists, who, to quote Arthur J. Eddy, "wear the paraphernalia and are photographed," is pictured in the *New York Evening Telegram*. This paper reports that a regular labor union has recently been formed among hired chauffeurs in Cleveland, and that another will probably soon be started in New York, and predicts the possibility of a strike being suddenly declared during the height of the touring season by a motor delegate (the

successor to the walking delegate) by means of the wireless telegraph. Imagine an automobile tourist comfortably reclining in the tonneau of his "King of the Belgians," speeding through a pretty mountain landscape hundreds of miles from home, when suddenly the chauffeur receives orders from union headquarters to "walk out." The car is run to the side of the road, the brakes put on, and the chauffeur makes mien to depart on foot. The owner is in a predicament; he has never occupied the driver's seat except when a photo of his car was taken, and does not know how to handle the levers; he is not familiar with the country, and does not know the distance to the next town or nearest railway station. What can he do but agree to the terms which the union may submit per wireless?

Some incidents in the recent waiters' strike in Chicago lend a touch of possibility to this prediction. The automobilist who does not know how to drive his car may some day be put to great inconvenience through the tyranny of trade unions.

The moral is obvious. Every owner of an automobile should learn to drive his machine himself, even if he does not intend to do it habitually. He should subscribe to *THE HORSELESS AGE* to become versed in the principles of automobile construction and operation, and should also take practical lessons at the wheel, to be prepared for any emergency of this kind.

The Dust Nuisance.

Much serious thought has been expended upon the dust problem in recent years, and a variety of solutions have been offered and numerous experiments made. The dust nuisance is on the whole considerably more serious in England and France than it is in this country, partly on account of the nature of the soil, which in England is quite favorable to dust production, and partly because there is less horse traffic on our roads than on those abroad, for it is the horse's hoof that grinds up the road material and covers the road with dust, and the pneumatic tire of the automobile only stirs it up. The nuisance is of course the greater the greater the number of automobiles traveling on a road, and the higher their speed. Thus the roads of the Riviera last spring were reported to be almost continually covered with a cloud of dust, fast automobiles passing over them in large numbers, and the automobilists were sometimes so heavily covered that "shoveling out" was suggested.

It is not only the automobilist who has to suffer from the dust—the nuisance is even more keenly felt by other road users and by residents along the main highways. It is even reported, on good authority, that in England residential property along certain highways much frequented by automobiles has declined in value recently, for no other reason than that the air in such localities is constantly laden with dust. The importance of the dust problem will thus be evident.

In this country, owing to the vastness of distances, dust remedies consisting in treatment of the road surface with sticky or absorbent material, would be quite out of the question; the efforts of the authorities and the good roads associations are practically monopolized by building new roads and improving the pavements of existing ones. Only that part of the dust problem which relates to the protection of automobilists is therefore of direct interest here.

Means of protection from dust are essentially of two kinds—first, those connected with the vehicle, and, second, dust-proof garments. During the last year the high back tonneau has become very popular for large touring cars, and the high seat backs are an obstruction to the dust eddies. More complete protection is secured, however, by placing a screen on top of the seat backs, rising to a height above the heads of the occupants, the lower edge of the screen making a substantially tight joint with the seat back. It has also been proposed to place the screen at some distance above the back and at an angle of about 45 degrees with the vertical, the rear edge being the lowest, so that the motion of the car causes a downward air current which opposes the rising dust current. The former arrangement seems to have been found preferable, however. The occupants of the rear seats always suffer the most from dust.

Since automobile touring has become so popular certain Paris and London tailors have invented many novelties in the line of automobile garments. Many of these are particularly designed to protect the wearers from the dust of the road. Thus, ladies riding in the tonneau seats of touring cars usually wear capes of dustproof material. To the casual observer it might appear that any such dustproof garments would be very uncomfortable in warm weather, but this is a mistaken notion, as the cool breezes of the rapid motion effectually prevent any feeling of discomfort.

Conditions of Commercial Motor Exploitation.

While there is on the whole a very satisfactory demand for motor vehicles for commercial purposes, manufacturers are constantly annoyed by erroneous notions about the capital necessary to invest in such vehicles and about certain fundamental principles which must be observed in the use of motor business wagons to insure commercial success. This applies particularly to the heavier class of vehicles, motor trucks and omnibuses. People all over the country are alive to certain advantages which motor traction insures, but are generally misinformed with regard to the capital outlay required. The opinion is frequently entertained that a good motor omnibus need cost no more than a horse bus and team of horses to transport the same number of people, and frequently negotiations have to be discontinued when the prospective purchaser is disillusioned on this point. It is also, as a rule, difficult to get a customer to understand that if continuous service is necessary, at least one reserve vehicle must be kept, so that a passenger service, for instance, cannot properly be conducted with less than two vehicles. In railroad work, and, in fact, in all other lines of mechanical transportation where a schedule must be maintained, a reserve equipment of considerable proportion is always provided, and the same conditions obtain in motor road transportation.

The Life of Automobiles.

A reader inquires: What should be the average life of an auto, say a runabout, with good usage and care?

We do not really see upon what basis this question can be answered. The life that it is possible to get out of an automobile of good construction, and handled with due care, is an entity which time and experience alone can determine. We do not believe sufficient reliable data can be obtained at present to arrive at a satisfactory answer. It is rare that a machine is used by the same person from the time it leaves the factory until it is entirely worn out—that is, during its entire life. The commercial life of a car would end when repairs are necessitated so frequently and are so expensive that it would be more economical to buy a new car. At present the original owner hardly ever runs a car until this stage is reached, and with cars changing hands several times before they are finally relegated, it is exceedingly diffi-

cult to obtain information regarding their total mileage.

It also appears that cars which have passed out of date frequently are sold into the country, and into out of the way places, where there is less incentive to be "up to date" in style, so that cars three or four years old are very rarely seen in the large cities. Occasionally, however, attention is called to an early machine, the most apparent signs of age generally being a short wheel base and a high body.

The life of a car will very largely depend upon two factors—the roads it travels on and the care it receives. Uneven, rough roads increase the wear all round, and necessitate more frequent repairs, with the result that the repair factor becomes prohibitive at an earlier period and the life of the machine is reduced. Frequent cleaning and thorough lubrication of all wearing parts, on the other hand, greatly increase the life. Wear can also be materially reduced by keeping all parts well adjusted—assuming that adjustment is possible.

Increase of durability is the great problem that now concerns automobile designers. The average automobile, as now built, is sufficiently speedy and powerful to satisfy all reasonable demands; it is economical in fuel, and quite reliable when new, as the results of reliability trials show; but its durability in general leaves much still to be desired. It is now necessary to increase the wearing surfaces and to make wearing parts adjustable and easily renewable.

The means of securing durability are thus fairly obvious, and the reader may ask why they have not been more applied. The answer is that larger wearing surfaces mean greater weight—more material and more labor—all through, and adjustable and easily renewable bearings also require a good deal more work in construction than bearings which once worn are completely useless. Users often argue that makers whose cars stand up best and show the greatest durability are the ones who will do the business several years hence, which will undoubtedly prove true if these makers succeed in continuing in business until then. The fact is that the average purchaser of today is not capable of distinguishing between good and poor mechanical workmanship, and of appreciating features which make for long life; he sees only the general form of the car, and the outside finish, and makes perhaps a short personal test of

its general running qualities and hill climbing ability. The bulk of orders, therefore, go to the maker who offers a car of satisfactory appearance and running qualities at the lowest price. Wearing qualities are discounted because the purchaser is unable to estimate them.

The above we believe to be the main reason why automobiles frequently are not so durable as is desirable. The education of constantly larger bodies of automobilists will remedy this condition in time.

It may be of interest to recall here a few figures on the life of cars which have been given in *THE HORSELESS AGE* at different times. A Denver physician about a year ago described his experience with a light steam carriage, which he had then run 6,000 miles. A Staten Island, N. Y., physician has run two gasoline cars of the same make together upward of 20,000 miles. In our Doctors' Number, a California physician stated that he had run his light gasoline car 6,000 to 7,000 miles without any perceptible wear in the bearings; he had also run a steam carriage for two years, and estimates the mileage with it at about 18,000 miles. A number of others had run 6,000 to 7,000 miles with light cars.

Our Touring Number.

We wish to remind our readers who are preparing contributions for our Touring Number, to be published September 2, that the manuscripts should be in our office by August 25. It is very desirable that all articles should be on hand in time, in order to avoid unnecessary haste and delay in getting the issue to press. We hope that many of those who have made extensive tours this summer and have met with interesting experiences will find time to write them down for our readers.

Calendar of Automobile Dates and Events.

August 30—International Races of the Frankfurt Automobile Club, Frankfurt-on-the-Main, Germany.

September 4—5—Cleveland Races.

September 6—13—Vienna Automobile Week.

September 7—8—Detroit Races.

September 11—Syracuse Races.

September 18—24—English Reliability Trials.

September 19—Narragansett Park Races.

September 12 or 19—Empire City Track Races, Yonkers.

October 2—Brighton Beach Races.

October 5—Frishton Cab and Delivery Wagon Trials.

October 7—14—New York-Pittsburg Endurance Contest.

December 10—25—Paris Automobile Exhibition.

Power Rating of Gasoline Motors— Proportion of Piston Displacement to Weight of Car.

By ALBERT L. CLOUGH.

The rated horse power of gasoline vehicles is a figure which is founded upon no definitely established or universally accepted calculation based upon the physical quantities involved—the cylinder bore, piston stroke and speed in revolutions per minute. There are plenty of formulae involving the above data, and an empirical constant, and some of them are quite useful. They can, none of them, of course, be of any more than approximate application.

Different automobile builders evidently make use of widely different methods in deciding upon the rating of their engines for publication, and thus large discrepancies manifest themselves.

It may, perhaps, be of interest to know what is the average practice of a large number of manufacturers in rating their motors. The speed at which the rated horse power is claimed to be delivered is seldom obtainable, but the cylinder dimensions are now generally given out freely to the public. If vehicles of the typical American runabout type or service cars, equipped with horizontal motors, are considered, the motor speeds may not prove widely different among them. The horse power rating of the motors of these cars will generally be based upon a speed not far outside the limits of 600 to 800 revolutions per minute, and a rough comparison among them may be made.

The piston displacement and rated horse power of the horizontal motors of twenty-two such cars have been tabulated, and it appears that the average manufacturer allows 19.13 cubic inches of piston displacement per horse power. Individual engines differ enormously among themselves in this regard. The lowest allowance of piston displacement per horse power among the vehicles tabulated is 12.52 cubic inches, and the highest is 28.27, and these two engines happen to be of almost the same construction, of the same rated horse power and not of widely different speed. The larger engines in the list possess on the average a very little greater allowance of cubic inches per horse power than the smaller ones. If a person knowing the bore and stroke in inches of a single cylinder horizontal American built automobile engine, or, indeed, of the average double cylinder motor, were to multiply together the square of the bore, the stroke and the constant .7854, and divide the product by 19, he would have roughly the rated horse power based upon a certain consensus of manufacturers' judgment. If he were to divide by 20 instead of 19 for convenience, he would be upon the safe side in this very approximate calculation. He would probably neither be grossly overrating nor underrating the machine, as far as popular estimation is concerned. The formula would read:

$$H. P. = \frac{\text{Bore}^2 \times \text{stroke} \times .7854}{20}$$

and it should be used only "for what it is worth."

The twenty-two vehicles compared being capable of speeds not widely different, and their stated weights all being obtainable, it was deemed not without interest to ascertain the average practice of manufacturers of this type of vehicle in regard to the allowance of cubic inches of piston displacement per hundred pounds of vehicle weight. This was found to be 11.68. That is, an average of 11.68 cubic inches of piston displacement has apparently been found necessary for each hundred pounds weight of the vehicle, in order to give it the requisite "ability." If one has a vehicle of this type weighing a certain number of hundred pounds, by multiplying this number into 11.7 he will obtain the inches of piston displacement which average practice appears to consider necessary for this class of service. If the amount obtained is less than his vehicle actually possesses, he may feel that his car is not underpowered. If the amount obtained is more, the suspicion may be entertained that his rig is not quite up to the accepted standard in this respect. It is to be hoped that no one will regard the figure given too seriously, for it is given simply as a possibly helpful one in making certain rough estimates of different vehicles.

Quite a number of runabouts and service vehicles are being constructed in this country employing a high speed vertical motor of the De Dion type, and corresponding figures have been obtained for six of this class. The average piston displacement per rated horse power in these cars is about 9.1 cubic inches, and for each 100 pounds stated weight of the vehicle is allowed 5.2 cubic inches in the motor on the average. The power rating per cubic inch in this class is about 2.09 times that of the slow speed horizontal type, and the vehicle weight per cubic inch is 2.24 times that allowed on the average by the manufacturers using the horizontal type.

The speed of these vertical motors is about twice that of the average horizontal engine of the American type, or 1,200 to 1,600, and this of course accounts very largely for the double value given to the cubic inch in the rating of the De Dion type motors. Of course, it is only upon the assumption that port openings are equally liberal in the two types, and that some other conditions are fulfilled, that this doubling of the horse power rating with doubled speed is justified. It is difficult to see how the users of the De Dion type of motors are warranted in making a more than double allowance of weight per cubic inch when the speed is on the average not more than doubled.

A very common length of stroke among the horizontal motors is 6 inches. At 750 revolutions per minute this would give a piston speed of 750 feet per minute, which is well up toward the limit of good practice.

About 4½ inches is an average length of stroke for the vertical De Dion type

motors. At 1,500 revolutions per minute a piston speed of over 1,000 feet per second is attained—a pretty high value.

Aristocracy in Business.

During the past six months a certain well known lady of title has sold three 20 horse power cars, one 40 horse power, one 60 horse power, and fourteen smaller cars, and when it is realized that the commission varies from 15 per cent. to 20 per cent., and that the price of a first rate 20 horse power car may be anything between £700 and £600, it will readily be seen how profitable an agency is to a lady who has opportunities of singing the praises of a particular make of car to wealthy friends.

To help his titled agent the manufacturer places a car, sometimes two, at her disposal, usually at her country house, sends down competent chauffeurs in smart uniforms, and keeps the cars in thorough going order, knowing well that a good run is more likely to influence a prospective purchaser than most things.

My lady manages her share of the business quite easily. Several non-motoring men—and women—are invited to her place in the country for the week end. A smart motor car, perhaps two, meets them at the station and conveys them to the house some few miles away in a few minutes, and that short run suffices to break down prejudice and create interest in the perhaps hitherto despised mode of locomotion.

The fair hostess is charmed that they enjoyed the ride so much, is astonished to hear that they have never ridden in a motor car before, and promises a long drive on the morrow. The chauffeur makes quite sure that his car is in perfect running order, for on no account must there be a breakdown, and the next morning, after a leisurely breakfast, a party is made up, and a nice little run to the coast and back—about 100 miles or so—is easily accomplished, before dinner. The guests are converted once and forever. They place orders for cars exactly like my lady's, and mention her name as a surety of special attention. The order is booked, and my lady receives her check for commission.—*Daily Mail.*

Daily Mileage of Electric Cabs.

Some interesting figures are given by the *Electrical Times* of the journeys made in a day by the electric broughams and landaulets at a well known garage. No notice being given of the test, the results shown are those which might be expected on any day. The total distance covered by 178 cars was 4,086 miles, just over 28 miles per vehicle. The longest run was 84 miles, made by a landaulette which was busy all day with shopping calls, visits, drives, and a journey to the theatre. Other cars covered 76, 68 and 56 miles each, and most of the remainder registered 40 miles or more. The reduction of the average was due to a number of cars being taken out for a spin of only half a dozen miles or so.

TOURING IN

AMERICA.

VIII.—Hudson River, Northern Section.

By C. H. GILLETTE.

In considering the touring possibilities of the upper Hudson, one of the first naturally occurring queries is in regard to the availability of the west shore. Every automobilist is more or less familiar with the fact that there is a touring road from Poughkeepsie to Albany on the east side

curious little dwelling on a terraced hillside, set about with trees, now known as Gros Bois. Its older name, Placentia, recalls a famous literary collaboration of the early part of the last century. Placentia was the home of James K. Paulding, who was of that brilliant group of wits that graced this country's infancy, and who, in association with Washington Irving, published "Salmagundie."

Al along the eastern bank in this direction one comes across the country residences of many well known people. Almost opposite Esopus Light House, the town of Staatsburg boasts of D. O. Mills as its principal resident. At Dinsmore's Point is the estate of the late W. B. Dinsmore with its big yellow mansion. Then comes Vander-

many respects, and has more of historic interest.

Hudson is a city of 10,000 inhabitants, perched on a bluff on the Western shores of the river. Here, too, the Dutch were pioneers. It was not until 1783 that the farm houses which formed a group in the vicinity began to assume the form of a village. The town was of almost mushroom growth after that, and in 1785 it was incorporated as the city of Hudson, and the third city of the State. This city derives its name from Henry Hudson, who at this spot ended his voyage in the Half Moon up the Hudson.

Steam navigation early destroyed the high hopes of Hudson, and, indeed, its glowing prospects of becoming the com-



SHOKAN VALLEY—SEEN FROM THE MAIN ROAD.

of the river, but few have any idea of the condition of the roads, etc., on the west shore.

Of the familiar east shore road there is but little to be said. Starting north from Poughkeepsie the road known commonly as the "old Albany Post road" runs through Hyde Park, Staatsburg, Rhinebeck, Red Hook, Clermont, Hudson and Kinderhook to Greenback, where a bridge crosses the river to Albany. It is a dirt road for practically the entire distance. The condition as far as Hudson (42 miles) is fairly good and the grades are not bad. From there on to Albany there are 32 miles of only fair road, and the grades are somewhat heavier.

There is much of interest along this road besides the beauties of the river and mountains. A mile beyond Hyde Park is a

berg Cove—a shallow indentation of the river—where is the residence of Jacob Ruppert, and just above on the slope that of Frinck, both New York brewers. Still farther on is ex-Vice President Levi P. Morton's summer dwelling, set in nearly 600 acres of gardens. Across the river from here rise the outlines of Hussey's Mountain, over a thousand feet high, and principally notable for its grim, ragged form.

Just beyond Staatsburg, the Old Post road bears away from the river to Rhinebeck, which is about 3 miles from Rhinecliff on the river, where there is a ferry to Kingston. There is a road, however, known as the "River road," which runs north from Rhinecliff through Barrytown, Tivoli and Linlithgow to Hudson. This road, although not so good for automobiles as the Post road, is more attractive in

mercial port of entrance of the State. In this city President Martin van Buren came into the world of prominence, and after a life of activity spent his declining years. Samuel J. Tilden grew from boyhood to manhood in this vicinity, and now rests on New Lebanon.

Many well known men of fame, orators and lawyers, prominent in the early political life of this country, lived at Hudson. Among them were Elisha Williams, Ambrose Spencer, William van Ness, Thomas Grosvenor, Jacob van Rensselaer and many others.

Columbia White Sulphur Springs, about 4 miles east of Hudson, used to be the Saratoga of the days when our grandfathers were young.

Just above Rhinecliff is a towered villa, "Fencliff," formerly the home of William



THE OLD SENATE HOUSE IN KINGSTON.

Astor, now that of John Jacob Astor 3d. In rapid succession follow the residences and estates of Lewis Ehlers, Douglas Merrit, Albert Terry and many others.

Barrytown was formerly known as Lower Red Hook. It served in the past as the landing place for Red Hook, a century old village, 2 miles from shore.

"Massena," the Aspenwall home, is just above. Upon a bluff faced hill overlooking South Bay Cove is an old mansion, Montgomery Hall, which was built by the widow of General Montgomery, who fell at the unsuccessful assault upon Quebec.

Opposite Malden is Clermont, an old manor house of the Livingston family of New York. It was built by Robert R. Livingston, one of the Provincial Committee of Safety of the Revolutionary times and

first chancellor of the State of New York. The Livingston family of today are lineal descendants of Lord Livingston, who in 1600 was created the first Earl Linlithgow. The fifth Earl, however, lost his earldom by joining the forces of the Pretender, so that the title is now extinct. Robert, one of this line, born in 1654, had been exiled with his father to Holland, and learning there Dutch ideas of liberty at last decided to come to America. He lived in Albany, becoming financially successful, until 1686; then he purchased 12 miles of lands from the Indians along the Hudson River, the estate comprising 250 square miles. Governor Dongan made this estate into the Lordship and Manor of Livingston. This pioneer of the Livingston family procured for Captain Kidd a privateering commission

against pirates, which Kidd ultimately turned into a true rover's commission. Time and time again people have dug in the manor grounds for some of Kidd's buried treasure. Robert Livingston left 13,000 acres to his second son, Robert, who called his share of the estate Clermont. About the time of the destruction of Kingston the old manor house was destroyed, but it was quickly rebuilt.

From Hudson the best road bears away from the river through Stuyvesant Falls and Kinderhook to a little settlement called Muzieskill, where a sharp turn to the left brings one to the river again at Schodack Landing. From here to Greenbush the road follows the river closely.

From Hudson there are two very good routes to Pittsfield. The lower one leads through Glaverack, Martindale, Hillsdale and South Egremont to Great Barrington, Mass. The other route branches north at Glaverack through Mellenville and Ghent to Chatham. From there one can go through New Conrad and State Line to Stockbridge or through East Chatham, Canaan, Four Corners and Shaker Village direct to Pittsfield.

The above routes, with the exception of one from Albany to Pittsfield and another from Albany to Bennington, Vt., which have been mentioned in a previous article, practically exhaust the tours on the east side between Poughkeepsie and Albany. There are, of course, a great many more stretches of good roads and plenty of interesting short side trips, but there is but little more in the way of through routes.

THE WEST SHORE.

On the west shore the Catskill Mountains are, of course, the principal scenic attraction. Starting from Poughkeepsie there are two routes to Kingston, one on either side of the river. There is a ferry from Poughkeepsie to Highland on the west side, and from there is a fairly good macadam road north along the river to Kingston.

Just beyond Crum Elbow Point the



THE LEEDS BRIDGE.



A ROAD NEAR CATSKILL.

western shore road becomes a little better suited to automobile touring. Here rises a small mountain, Mount Hymettus, so named by John Burroughs, that great, lovable author-naturalist, because in his nature explorations he found there wild honey and bee trees in profusion. Nearby is his cottage. Toward the north, Mount Hymettus descends in a series of giant steps almost to the low level of the horizon. The sky line of these foot hills—Esopus Hills—makes a beautiful silhouette against a sunset sky. Along this road upon the river slope are many beautiful scenic spots chosen by city dwellers for their summer homes—buildings from the cosy cottage type to those of palatial dimensions.

On this west shore road the hills are rather difficult, and as two ferries are necessary (the second being from Sleightburg to Rondout) the east side route is generally preferred. The ferry at Rhinecliff makes only about hourly trips, but notwithstanding this the majority of tourists take this route.

There is much of historical interest in and about Kingston, and with its old Senate House (now owned by the State) and its many other historical buildings it is well worth a stop.

The name which Kingston has borne since September 25, 1675, given it in honor of Kingston Lisle, of England, where the colonial governor, Lovelace, was born, was not the name which it once had under the Dutch régime. Wildwyck was the name chosen by Governor Stuyvesant. This town has seen a great deal of Indian fighting, and has a long sanguinary history, which our nation's annals have not recorded.

There are houses still standing in Kingston, which, if they could speak, could tell the history of this town from a very early date. Here the old Croonstadt Elmendorf Tavern at Maiden Lane and Fair street, upon one of the gables of which is the date 1725, was the witness of many an important political event in our Revolution. Not much after this building was erected, it saw the completion of the present Court House of Kingston.



STATE CAPITOL AT ALBANY.

The Van Steinburgh House, which was one of the few buildings that escaped the burning of the town by the British in 1777, was standing until 1808. The building, which used to be the Kingston Academy at John and Crown streets, now the home of the Hon. Augustus Schoonmaker, is one of those serviceable old structures, no doubt with a quaint and curious history of its own, which none will ever know, and which has stood the tide of two centuries.

Kingston can boast of a church which has held the longest unbroken line of services in practically the same building of any in the United States. It is the Dutch Church. It has, however, been remodeled lately, and consequently has lost much of the glamour of its extreme age. This church was built in 1657.

The museum at Kingston contains many documents of interest to those who care anything about knowing the manners and

customs of these old Dutch burghers who settled Kingston.

The burning of Kingston by Vaughn, the British commander, on October 16, 1777, was one of the most ruthless acts of the British in the Revolution. After they had captured the Highland Forts, the British fleets, sailing up the river to the mouth of the Rondout, destroyed all the small earth-works there.

Led by Vaughn the British troops landed, and guided by the Tory Lefferts into Kingston, and encountering no resistance, burned the town. The villagers fled, offering little or no resistance, taking with them such of their personal effects as they had time to collect. Vaughn, after the destruction of Kingston, retired immediately with his troops and the booty to the ships, fearing the rapidly advancing American troops. So exasperated was the American commander that Lieutenant Taylor, a spy, who



PLEASANT VALLEY FROM THE HOTEL SAUGERTIES.



VIEW IN AN ALBANY PARK.

had been captured at New Windsor, was executed without benefit of court martial.

From Kingston there is a fairly good road north along the river to Catskill, a distance of 21 miles. The first 12 miles of this road—that is to Saugerties—is macadam in good condition with only moderate grades. The rest of the way (9 miles) is a fair, dirt road with rather difficult hills. From Catskill to Albany is practically impossible for automobiles, although there is an almost direct road along the river through Athens, Coxsackie, Coeymans and Becker Comas. There are no good side routes above Catskill, and this entire section must be covered by routes radiating from either Kingston or Catskill into the mountains back from the river.

The Catskill Mountains are not really mountains at all. When we turn our mental eye upon the great Western mountains of the Sierra Nevadas and the Rockies, the Catskills dwarf into mere molehills in comparison. They have not the grandeur of the White Mountains of New Hampshire, but they have something of scenic value that makes them sought as a roaming ground for recreation seekers. Besides their many hotels and resorts they have lately induced hundreds of people to build country residences where they may spend their summers. The Catskills, not being very far distant from the central business cities and easily accessible by rail, are very convenient.

Probably the best bit of mountain scenery to be viewed in the Catskills is the Kaaterskill Clove, but for the combination of scenic beauty with human interest Stony Clove is in the opinion of many people the better attraction. A ravine, deep and narrow, buttressed with ragged rocks, Stony Clove makes a sharp contrast with the precipitous mountains about it, covered only with woods and underbrush. Down through this cliff tumbles a mountain stream, with its year round song for ears to feast upon. A mountain road inclines upward along its side, which is the tramping ground of those who love beauty and seek rest.

THE CATSKILLS.

There has been so much inquiring lately in regard to the possibilities of the Catskill Mountains for automobile touring that the writer was led to make a personal investigation of this territory. The main touring routes in the Catskills are the roads bearing east and west. The roads running north and south are for the most part rather poor and offer heavier grades and greater obstacles than the latitudinal highways.

The Catskill Mountains proper do not commence at the river as many people suppose. For to miles west of the river the country is nearly level, and then the mountains rise abruptly. The ascent is quite steep on most of the roads, but is made easy for automobiles by the method of grading, which consists of making a short steep pitch of perhaps 25 yards, and then a level

stretch for "breathing" horses, or, in the case of the automobile, for "picking up."

Once on top of the mountains one finds rolling country, the formation being in the nature of a plateau. There are innumerable side trips through the valleys or "cloves," as they are locally called, and scenery of the wildest and most delightful sort is to be found.

The two main entrances to the mountains are from Kingston and Catskill. The best road from Kingston, and the one offering the easiest grades, is through Stony Hollow, West Hurley, Olive, Shokan, Boiceville, Phoenicia and Shandaken to Big Indian and Pine Hill. This road continues on through Fleischman's, Arkville and New Kingston to Delhi, and is the route selected for the proposed New York to Chicago run.

This road is stone as far as Shokan, but on account of the heavy trucking of stone from the quarries on narrow tires is generally badly cut up. From Shokan on, the road is of dirt in fair condition, and the grades are heavier.

At Phoenicia a turn to the left takes one through the Stony Clove to Kaaterskill, one of the most beautiful trips in this section. From Shandaken there is another cross route through Westkill to Lexington which, although a rather hilly dirt road, is possible for good automobile.

The main route from Catskill into the mountains is through Jefferson, Leeds, Cairo, South Durham, Windham, Ashland and Prattville to Grand Gorge. This route can be continued to Oneonta by going through Stamford, North Kortright, Davenport and Davenport Centre.

The road as far as Cairo (10 miles) is good and level. From there, it is a rolling and then hilly dirt road in fair to poor condition. It is not as good as the Kingston-Delhi route, although possessing fully as much to recommend it as a scenic route.

To sum up, it may be said of touring in the Catskills that it is entirely possible for a good, reliable, hill climbing automobile. For such there are no serious obstacles, although the roads are not of the best, and the grades are heavier than ordinary. Any other than such a car had better not attempt to explore these delightful mountains.

There have been so few automobiles in this section that the facilities for their repair and supplies are neither very good nor frequent. There are plenty of good hotels, however, and the majority of these offer storage conveniences and supply gasoline.

A tourist with a good "hill climber" and a lively interest in scenic beauty will go far before he will find a better section for the exploration and enjoyment of nature. He must have his mind made up to actually explore, because, even among the natives, very few can give him definite information (other than regarding the roads described above) that will help him to decide his route. The roads are known from the "horse and buggy" standpoint, but not from that of the automobile.

LESSONS OF THE ROAD

Tales of Summer Touring.

By HARRY B. HAINES.
Concluded.

At the station I found the agent anxiously awaiting its arrival with a gentleman and two ladies, all prospective purchasers, who had come to buy the car.

UNSUCCESSFUL DEMONSTRATION.

I at once abdicated in his favor, after whispering to him that the machine was not working very well. He started off, and the auto bore out my words by stopping dead still a half block away when he attempted to run on the high speed. He managed to get the motor going again and took the party to the depot on the low speed gears. Upon his return, which was after dinner, I decided to go out again, and very "foxily" invited one of the machinists to go with me. As I had expected, we were soon stalled, and upon investigation he discovered that the rod which opened the compression had been shifting and slipping and the motor had been running all day with the compression half open. He reached under the machine and forced the compression relief closed and the engine at once started off at the first turn, and upon the gears being thrown in developed considerably more power. It only continued on its good behavior for a short time, however, when suddenly, and apparently without cause, it stopped and the machine came to a standstill. No amount of turning would produce an explosion, although the spark was found to be all right, and it was then decided to try the carburetor.

The adjustment on this was placed at all the points of the compass, with varying success, and finally, when we got the motor going, the mechanic took up the floor boards of the tonneau, and sitting there, kept his fingers on the adjusting screw and varied it from time to time as the motor gave signs of stopping. We managed to get down town and back in this manner, and then we decided to put the machine up for the night. This was at 8 o'clock, and the mechanic prevailed upon me, against my best judgment, to just go down the brick pavement a few blocks and try the machine once more, he having made some adjustment that he thought was just what the engine needed.

I consented, and we started off, but the CARBURETOR PROVED THE MASTER of both of us and the situation also, and we stalled about six blocks from the storage station. I left the mechanic still working there at 10 o'clock trying to get a few explosions out of the motor, and later learned that he finally did succeed in running the car home under its own power, after practically overhauling and reconstructing it on the road.

My own machine was ready in a day or so, and my next really long ride was taken on the Fourth of July. That day was a scorcher for heat, but despite that I covered over 100 miles with four passengers at a rate of speed varying from 20 to 25 miles an hour, part of the run being on the low speed up Kelly's Hill, across the Brooklyn Bridge and over the cobblestone pavements of that city, and the engine was at no time overheated to any appreciable extent.

The test altogether was a most severe one, the thermometer being up to 90. The air cooling system used on my car proved to be perfectly capable of taking care of all the heat the big 5 by 8 inch cylinder could generate.

A RECORD.

On this trip I made absolutely no adjustments, had no trouble of any sort, and had it been a hundred mile endurance contest would have carried off first prize. In view of future possibilities I am "touching wood" as I write this.

The following day I essayed to run to Far Rockaway, a distance of 110 miles or more for the round trip. I started early in the morning, with three passengers, intending to make a day of it, and reached the Forty-second street ferry in an hour, the distance being between 22 and 23 miles. The motor stopped on the ferry boat without an explosion from heat, and, as was my custom, I decided to oil up on the trip across. Upon going to the rear of the machine I discovered that one of the rear tires was flat, but could not find a trace of a nail. A small cut on the shoe (which was a new one) was all that I could see. On the New York side I ran the car off the boat and into the ferry house, and foolishly enough jacked up the wheel and removed the shoe, taking out the inner tube before trying to pump it up. I could find no hole or leak in the tube, and upon putting air in it and testing the valve I discovered that the leak was there. I took out the valve spring and found that it was rusted and would not act properly. Having a new valve spring I put it in, and the tube then held air in good shape. The tube was put back into the shoe and the latter replaced, the whole job having taken half an hour.

A TIRE KINK.

To the users of double tube tires it might be interesting to know that after a new tube is inserted in the shoe, if it is pumped up just enough to round it out, all possibility of getting the tube twisted or pinching it when the outside edge of the shoe is applied will be avoided.

It cost me \$15 to learn this little trick, as I pinched and practically ruined two shoes worth \$7.50 each by putting the shoe in place before inflating the tubes.

The tire once more pumped up, we continued on our trip, crossing the Thirty-fourth street ferry into Long Island city, and thence out to the Hoffman boulevard and the Merrick road.

While traveling over this stretch of fine

macadam I witnessed a most distressing accident to a young woman driving alone in a buggy. I was coming along the road at a fair rate of speed when the young lady turned a corner about two blocks ahead and started toward me. She held up her hand for me to stop, indicating that her horse was frightened, and I pulled up to one side of the road to allow her to pass. At that moment I heard the sound of what seemed to be several horns, and two high powered French machines dashed around the corner, going at least 40 miles an hour, and apparently racing. The young woman's horse started to bolt as she tried to drag it to one side of the road, in order to avoid the autos which were bearing down upon her. The animal became infuriated and suddenly bolted, turning shortly as the two machines dashed past, and cranking the front wheels under the high trap upset the vehicle. The driver was thrown out with considerable force, and the horse dashed down the road dragging the rig on its side after him.

"ROAD HOGS."

The "road hogs" in the two machines never stopped but disappeared down the road in a cloud of dust before anyone could get a glimpse of their numbers. I stopped my motor and ran with others to the young girl's assistance. She was badly shaken up and bruised, but was not seriously injured.

I believe in automobile speeding in the proper places and where the lives of others are not endangered, but it is just such exhibitions as this that prejudice people against horseless vehicles and their drivers, and lead them to believe that all owners of machines are heartless, ill bred eads.

When the young girl had been taken away I continued on my trip and reached my destination only to find myself in a new predicament.

I had been carrying a can of spare cylinder oil in the front of the car, and this had in some manner sprung a leak and dripped down on the fan belt, soaking it with oil. The idler had not been able to exert sufficient pressure to keep the belt moving, and the fan had consequently failed to work, as a result of which the motor was hot beyond all comfort, and I had an interesting five minutes stopping it from exploding after I had pulled the switch plug out. In order to accomplish this I had to apply the low speed and brake at once, and later the brake and reverse, until the engine finally gave up.

When the motor had cooled and I had been refreshed with a lunch I took the old fan belt off, and put on a new one that I had along. This, of course, put an end to all heating troubles.

The trip back home was uneventful, except for the fact that when within 2 miles of my house on a level stretch of road, through a mosquito infested section, a rear tire punctured and went flat. I was nearly eaten up by the pests in the twenty minutes required to jack up the wheel and put

in a new inner tube in place of the damaged one.

GIVING A RIDE TO CITY FATHERS.

Two days later, in company with several other local automobilists, I started off on a trip with the members of the street committee of the local board of aldermen. The macadam and some of the asphalt streets in our city are in poor shape, and it was the idea of the automobilists to take the city fathers around and point out these places to them so that they could be repaired, and incidentally to give them a good shaking up in order that they might remember the necessity of getting to work at once.

It fell to my lot to have as a passenger the city clerk who was to make notes of the bad spots and keep them for the future reference of the aldermen.

Everything went along in good shape for the first mile or two, and then, while we were crossing the main street of the city on our way to the over the river section, the motor suddenly started to skip spark and then stopped short, leaving me stranded directly in the path of an approaching trolley car.

I got out, and with the assistance of some interested spectators pushed the machine to the side of the road. It was 2 o'clock in the afternoon and the sun was scorching hot, and I of course was in a place entirely unshaded. The other machines rushed by. I assuring them that the delay was due to some trivial circumstance and that I would be along in a moment.

WIRES BROKEN.

My official passenger was piled out after I had turned the motor over half a dozen times without a single explosion, and I took up the floor board to have a look at the wire connections. My first glance showed me that the wire leading from the spark coil to the platinum points in the interrupter box had broken at the end of the terminal where it had been spliced once before.

I secured a piece of wire from my tool box and spliced it to the broken end, and then, getting out a wrench, loosened the nut holding the wire terminal in place. There are two nuts at this point, the under one doing the duty of holding the upper platinum point in place. In my hurry to get going again I unconsciously turned this nut and the spark point with it, leaving one platinum (the under one) in its proper place and the upper one turned completely around.

I of course did not know of this, and it was soon demonstrated to me that to make haste slowly is much the best course. After having made the wire connection I tried to start the motor, but was able to get but one explosion at a time, the second one invariably occurring in the muffler, after which the engine would of course stop.

I was surrounded by a crowd whose number I did not dare to guess, but they

completely blocked the street and hampered my every movement by endeavoring to get close to the machine to see what I was doing.

TURNED THE CRANK WITHOUT RESULT.

I turned the handle for at least half an hour, the perspiration streaming from me, when an automobile of similar make to my own came along. I knew the owner of the rig and he stopped to help me, and after ten minutes' more turning gave it up as a bad job and advised me to telephone the repair station for a tow. He also offered to take the now tired and impatient city clerk and complete the route laid out with him, and I gratefully accepted his proposition and sent my passenger off rejoicing.

After he had gone I decided to take the spark box cover off and have a look at the platinum points, having gone over everything else on the wagon. I then discovered that the adjustment of the points had been disturbed, and it did not take me long to put them back into their original shape.

The motor then started at the first turn, but skipped spark, and after trying to remedy this by setting the carburetor at a different point I decided to start back for the repair station and let the men there work on the thing, being nearly exhausted by my long stay in the boiling hot sun.

I was going along at my best speed, something better than 25 miles an hour, and was within a block of the repair station, when the motor suddenly stopped exploding. The momentum of the wagon kept it going and I sat still, expecting to hear the motor start again at any moment.

I must have traveled at least 50 feet and compressed thirty or forty charges of gasoline when it occurred to me that I had best pull out the switch plug and start to investigate. I put my hand down to the switch, when suddenly there came

A ROARING EXPLOSION

that fairly shook the machine, sending it leaping forward. A woman who was walking along the street near me grabbed her skirts far above the rainy day line and made a sprint up a nearby terrace, meantime screaming with fright. I hung on to the steering lever for dear life and awaited developments. At first I had a hazy impression that perhaps there was a miniature spark at work in the gasoline tank, but my fears were banished when, a moment later, the motor started exploding regularly again and with that sound, familiar to all automobilists, that indicates a cut-off on the muffler.

I then realized what had happened, for a few days before I had seen the muffler blown out on a French four cylinder car, the owner while experimenting with it having held down three of the four tremblers on the coil for several seconds and then let them all up at once, a loud explosion following that tore the muffler

apart and hurled the end of it 50 feet through the air.

THE EFFECT ON THE MUFFLER.

I continued down to the storage station and then got out to investigate. I found that the force of the explosion had utterly wrecked one of the three muffler shells, literally tearing it to pieces. These shells are round in shape, about 4 feet long and 4 to 6 inches in diameter. They are made of sheet steel, riveted at inch intervals along their length. Splinters of the steel were driven by the force of the explosion into the rear wheels, and were so deeply imbedded that it was necessary to use a pair of plyers in order to get them out. The shell wrecked, strangely enough, was the last of the line of three and the one farthest away from the exhaust valve through which the explosive force had come.

I was glad to find that no further damage had been done, and a telegraph order was sent to the factory at once for three new shells. This little experience will mean an additional \$10 on my expense account by the time the old muffler has been taken out and the new shells put in place.

I do not understand how the explosions in the muffler occur, and it would no doubt be interesting to many persons if this strange action were technically explained.

LONG SERVICE FROM DRY BATTERIES.

The explosion of the muffler does not affect the running of the car, except that it makes a noise like a freight engine. My batteries upon test proved to be very weak. I having run over 2,000 miles on one set of four small dry cells, a more economical showing than I was ever able to make with any of the light runabouts that I have owned. A new set was put in, and with a new wire inserted the car was ready for service again.

These are a few of the things that add to the delightful uncertainty of the auto and keep the owner keenly aware of the fact that he is alive and doing. I am still awaiting future experiences, and presume that I will get all that is coming to me before the present season is closed, as I have several long tours in prospect that will add 1,000 or 2,000 more miles to my road experience.

Diary Notes of a User.

By * * *

Having had a detachable tonneau built for my vehicle, roomy enough for three additional passengers, I began to anticipate some delightful excursions into the country, although the roads are very rough, hilly and sandy hereabouts. In this I have not been disappointed. To me there is very little enjoyment in running about the city, covering the same old streets, day after day, and I would far rather give the old motor a change of scene and "turn it out in other pastures green." In some cases I have actually succeeded in accom-

plishing the latter when the roads were too slippery.

One day late in June we started out with "four up" for a city about eighteen miles distant. I was somewhat interested to notice how the motor would carry the extra weight of the tonneau and its two occupants, but was pleased to find that there was very little difference apparent in the performance of the vehicle with and without the extra load.

This is one point in favor of a heavy vehicle—that the number of passengers carried appears to make very little difference. When a car weighs 3,000 pounds without load the addition of 300 pounds of live weight and 100 pounds of tonneau makes a total increase of only about 20 per cent., while the addition of the same live weight and 75 pounds of tonneau to a car weighing 800 pounds would mean an increase of 47 per cent. to the total load hauled, and would mean a serious difference in the performance of the vehicle.

SKIDDING INDICATES A FLAT TIRE.

We whizzed along merrily until about three miles from our destination, when I noticed a very peculiar skidding of the rear of the car, and as the road appeared to be perfectly dry I was puzzled for a moment in regard to the cause.

It then occurred to me that I had a flat tire and was experiencing in a slight degree the skidding which has been the cause of such serious accidents among the racers.

We ran along a little farther to a house which we afterward found was the abode of a machinist who had all manner of tools. I do not carry a jack in my outfit, but our mechanical friend brought us plenty of blocking and a long piece of scantling for a lever, and we soon laid the wheel off the ground. Then it became evident how widely different are the theory and practice of

TIRE REPLACEMENT ON THE ROAD.

The tires I was using are of a very excellent make, and I had read the instruction book carefully, but it had so happened that no occasion for removing them on the road had ever before arisen. I remember having seen a tire advertisement, which consisted of a picture of two hands, and below it was the legend, "The only tools necessary for the repair of the — tire." We used the aforesaid tools—about six of them—and a small and well assorted machine shop as well: It was not a white kid glove job. The tire was of the bolted flange type, and we soon found that when the nuts were taken off the bolts after much labor and nicking of paint, through our not having the special socket wrench provided for the purpose, the bolts would not come out, as they were firmly rusted into the fabric of the heavy lugs of the shoe. We had to drive them out forcibly with a drift pin, with the result that their threads were upset and some of them would not take their nuts again. When the bolts were finally removed we expected the shoe to

slip off easily (as per book of instructions), but no amount of pulling and prying would at first dislodge it, as it was firmly rusted to the steel rim which encircles the felloe of the wheel. The only way we could start it was by driving a cold chisel between the shoe and the rim, and continuing this process all the way around the wheel. If this rim had been galvanized, plated or enameled, and if the bolts had been similarly treated, the removal of the shoe would have been easy.

NEW VALVE LEAKS.

Finally it was off, and as I had carried an extra inner tube and a pump we were comparatively happy. The new tube was soon in place, and enough of the bolts would take their nuts to secure the tire sufficiently. We performed the operation of inflation only to find that the valve of the new tube would not hold air. We effected a "swap" with the valve of the burst tube and the repair was at last completed.

The defective tube was found to have become uncemented at the junction of the two ends. The tire was pretty hot when we stopped and the heat had perhaps melted the cement and caused the tube to open.

CARBIDE TANK LOST.

We put in an hour and a half on this little episode, and when we were ready to start it was time for lamps to be lighted. I made a motion to turn on the water supply of one of the acetylene lamps, but found that the entire carbide chamber had dropped off on the road. I never saw it again. Probably when it had last been filled a small piece of carbide had been caught between the rubber washer and the body of the lamp, and had prevented the carbide container from being screwed on securely. The burner of the other lamp was nearly filled with deposited carbon, and not having a burner cleaner we had very little light, yet enough to enable us to make a good run home.

ADDS SEAT CONTROL OF GASOLINE.

I had been having considerable trouble at times from an imperfect mixture, and as the carburetor is one which gives a mixture somewhat dependent in its quality upon the speed, it proved difficult to adjust it satisfactorily. I could not adjust it for full throttle when in the stable, as this necessitated racing the engine at a dangerous rate, and then it did not duplicate the conditions of practice as to load. I could not adjust it from the seat, as the adjustment stem was below the footboard and secured by a set screw.

It was decided to arrange matters so that a perfect adjustment could be made at any time from the seat, suitable for full throttle opening under load. A hole was accordingly bored in the footboard directly above the adjusting stem, the stem was elongated so that its thumb nut came flush with the floor, and a spring detent was applied to hold the stem, where it was set by engaging with a coarsely knurled nut carried by it.

DEFECT IN ENGINE CONTROL.

Some trouble had been experienced in not being able to adjust the engine to run slowly enough while the vehicle was standing. If it was attempted to adjust the inlet valves of the two cylinders for a very slight throw on closed throttle, it proved impossible to secure even running of the two engines. Probably this might have been due to inequality of the inlet valve springs and a difference in the tightness of the pistons. When I succeeded in slowing down the engine sufficiently by the employment of a late spark, I found that the range of spark position was insufficient to speed up the engine to its maximum when desired. To remedy this defect, the spark throw was increased by simply lengthening one of the bell crank levers which connect the contact box with the operating device. I can now slow down the engine very greatly while the vehicle is standing.

PUZZLING ACTION OF ENGINE.

After a number of successful trips into the rough and hilly but beautiful country in this vicinity, on which nothing unusual happened, I was surprised one day to find that my engine was missing very badly. The spark seemed so strong when the engine was turned over by hand and the discharge was viewed in the open air, that I was not ready to believe that the trouble was one of ignition, well aware as I was that the character of the spark in the open air is no criterion as to its effectiveness when under compression.

The carburetor consequently fell under suspicion and was cleaned, but the float proved to be tight and everything in good shape. I have found that in the vast majority of these cases the carburetor is entirely blameless, and the trouble is in reality purely one of ignition. A mixture must be had indeed that will not ignite at all when there is actually a "healthy" spark in the cylinder.

Nevertheless, the insertion of temporary spark gaps in the secondary circuits was required before I could really believe that the defect was one of ignition—the "juice" seemed so energetic. Temporary spark gaps made by cutting the secondary wire which leads to the plug, twisting the insulation of the severed ends together and leaving the bare ends a sixteenth of an inch apart, are very useful in locating ignition difficulties. The use of this simple device demonstrated that the defect was one of irregular sparking.

THE LOCATION OF IGNITION DIFFICULTIES.

is a peculiar problem, as so many factors are simultaneously involved. It is like the solution of an equation containing five or six unknown quantities. We have the plug, which may be broken down electrically; we have the primary wiring, which may be short-circuited or interrupted; the contact device may make a poor connection; the secondary wiring may be short-circuited; the battery may be weak in voltage,

of high resistance or may contain a bad contact. Then there may be trouble in the coil; the vibrator may fail to respond to the passage of current; the condenser may be broken down so as to cut out the vibrator, or the secondary may be short-circuited. It is no wonder that a deal of time is likely to be wasted in finding the exact point where the defect is situated. If one had a spare contact device, coil, battery and plugs, known to be in perfect condition, and these could be separately and successively substituted for the one on the machine, and then, if temporary primary and secondary wiring could be installed, no doubt the defective portion of the apparatus would soon become manifest by the cessation of the trouble upon its removal, but very few people have this spare apparatus.

A SIMPLE TESTING INSTRUMENT.

The vibrators were cleaned and adjusted; temporary wiring was installed; a new battery was connected, and the contact device was removed and thought to be in perfect condition, but the trouble still persisted. It was thought that the difficulty might be in the coils, but this seemed unlikely, as the discharge appeared very strong when it occurred at all. At last, a telephone receiver being at hand, it was connected into the primary circuit, properly shunted. Upon the passage of the secondary current a musical "buzz" was heard corresponding to the period of the vibrator. The engine was then started, and it was found that no sound was heard in the telephone at the times when the engine missed. This rendered it fairly certain that the contact device failed to complete the circuit properly, and it was taken off for inspection.

This contact device consists of a fibre roller carried on the secondary shaft, which has inserted in its peripheral surface a brass strip like a single commutator bar. Upon this fibre roller bear radially two pairs of stationary spring-pressed brass rods—a pair for each cylinder. When the brass strip comes simultaneously under a pair of these brass rods the circuit is closed for one cylinder.

WEAR OF COMMUTATOR THE CAUSE.

When the fibre roller was removed and put on an arbor in a lathe to be cleaned it was found that the brass strip had worn down slightly below the level of the fibre, but sufficiently to cause the contact rods to skip the metal segment at high speeds and thus fail of a contact. The whole roller was triced up with a file in a lathe (emery cloth or sandpaper should never be used, as the abrasive beds in the brass and keeps on cutting), and the fibre was slightly cut away at the edges of the brass strip to prevent metal particles from being carried over onto the insulation; a light coat of vaseline was applied to the whole roller and no further trouble has been experienced from this source. It may seem foolish to go into detail to the above extent, but this ignitor matter seems a question of minute attention to apparently minor points.

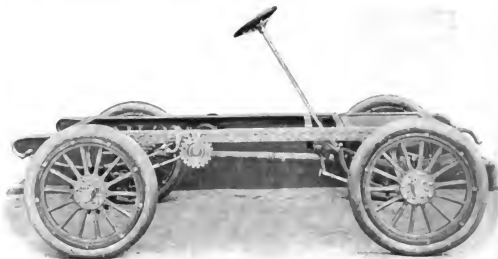
NEW VEHICLES AND PARTS.

Daimler Motor Omnibus.

The Daimler Manufacturing Company, of Long Island City, N. Y., have just completed a twenty passenger motor omnibus for the National Automobile and Manufacturers' Company, of San Francisco. The omnibus is to be used for passenger service between two trolley lines in San Francisco. It is equipped with a 20 horse power four cylinder gasoline motor, and a four speed transmission gear on the regular Daimler system. The weight complete without passengers is 6,155 pounds, of which 3,380 pounds rest on the rear wheels, and 2,775 on the front. The drive to the rear wheels is by separate chains. Two independent brakes are provided, both of which are double acting. One is a foot brake which acts on the transmission gear, and the other a hand brake acting internally against brake drums fastened to the rear wheels. The cooling system comprises a beehive radiator, and only 7 to 8 gallons of water are carried. The fuel tank has a capacity of 20 gallons.

The main frame is built up of channel steel, and a sub-frame is provided on which the engine and transmission gear case are mounted. The ratio of transmission from the countershaft to the rear wheels is 1 to 4. All the four wheels are 36 inches in diameter, and are shod with $3\frac{1}{2}$ inch solid rubber tires. The body is quite roomy, and is built similar to street car bodies, having two longitudinal benches, comfortably upholstered, and windows all around. The driver on the front seat is protected from the inclemencies of the weather by a forward extension of the roof and by a glass front.

The route upon which it is proposed to run the omnibus comprises a number of steep hills, one being a grade of 10 per cent., and the purchasers of the machine exacted a guaranty that it should be able to easily climb this grade with a full complement of passengers. The manufacturers,



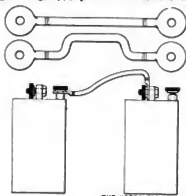
NEUSTADT-PERRY RUNNING GEAR.

in order to determine the hill climbing power of the bus, on August 7 ran it up the Lexington avenue hill from 103d to 102d street, which, according to the Bureau of Highways, is a grade of 12.5 per cent., carrying twenty-one passengers of a total weight of 3,117½ pounds. The bus made

carried up the hill, the engine never dropping below its normal speed.

Neustadt-Perry Running Gear.

The Neustadt-Perry Company, of St. Louis, have recently supplied to a concern in the Far North a running gear for a touring car, of which a cut is shown herewith. The gear has artillery wheels with large flanges of polished brass. There is a double row of heavy headed nickel plated bolts along the sides. The brake drums are cast integral with the flanges of the wheel and driving sprocket. The drive is by chain to each rear wheel from the ends of a countershaft. The angle iron frame is riveted and reinforced. A special feature of the gear is the design of the frame connections. The rear hangers are extended so as to draw the spring cradle fashion and nearer the wheels. In front the springs are bolted into projections of the frame at right angles. The steering mechanism is also of a new type and is ornamented with brass.



DYKE'S BATTERY CONNECTOR.

the ascent without difficulty. On August 9 another test was made on the same hill, and twenty-two street urchins and six grown persons, including the writer, were

Dyke's Battery Connector.

Dry cells for ignition purposes should preferably be connected to each other with flexible conductors with regular sheet copper terminals soldered on, instead of by a simple wire twisted around the binding posts and fastened by nuts. The improved connector herewith shown is marketed by A. L. Dyke, of St. Louis. The copper terminals are connected by a flexible insulated wire which can be bent into any shape.



DAIMLER TWENTY-FOUR HORSE POWER PASSENGER BUS.

The Pedestrians' Protection League, of London, is favorable on the whole to the passing of the pending Motor Cars Bill, recognizing in it an honest attempt to deal with a very difficult problem. The title of the league is to be altered to the "Public Roads Protection League," to embrace the interests of owners, riders and drivers of horses, as well as interests of pedestrians.



The Clement Four Cylinder Motor.

At the last Madison Square Garden Show an object of considerable interest was a four cylinder chassis built by the Clement Works of Paris, which was exhibited in the basement. The features which excited the most interest were, perhaps, the abnormal complication of the engine and the high finish given to all parts, including the body springs. A number of drawings of this engine and of its carburetor are shown herewith.

The four cylinders are cast in two pairs, each pair being integral with its jacket and head. The two cylinders of each pair are bored out in one operation, which is claimed to insure perfect parallelism. The water jackets completely surround the cylinder heads and valve chambers, and are accessible through a removable top plate, which is held in place by two bolts. Each pair of cylinders is fixed to the crank case by means of six stud bolts; the crank case is cast in partium, in two parts, with a horizontal joint, and is provided with two plugs at the bottom for draining out the oil.

The motor is fixed to the frame by four arms, cast integral with the crank chamber. The crank is constructed of soft steel, which is case hardened, and has all its bearings ground true. The crank is of the four throw variety, causing the two outside and two inside pistons to move in the same direction respectively. The connec-

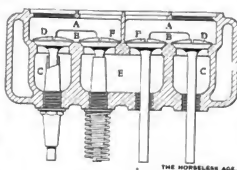


FIG. 3.—VALVE ARRANGEMENT.

tion rods are steel drop forgings, and are slightly hardened to increase their strength. The connection rod heads are in two parts, and fitted with a bronze bearing. The pistons are fitted with three packing rings at their upper end, and a fourth ring holds the piston pin against longitudinal movement, which avoids the need for a set screw, and the attendant possibility of trouble. This latter ring is, of course, of greater width than the others.

Both inlet and exhaust valves are mechanically operated, and are disposed in valve chambers on the same side of the cylinder. Fig. 3 herewith shows a section through the valve chambers of one pair of cylinders. The valve chamber corresponding to one cylinder is divided into three compartments—the compartment A, which is in continuous communication with the combustion chamber through the passage B; the compartment C separated from the compartment A by the valve D, and the compartment E separated from compartment A by the valve F. The two outer

valves are the exhaust valves, while the two inner valves are the inlet valves. The two inlet valves place the two cylinders in communication with the same inlet passage, and there is, therefore, only one inlet pipe connection for each pair of cylinders, while two exhaust connections to each pair of cylinders are required. The exhaust pipe consists of a special manifold casting, which is secured to the valve chamber by flanged joints.

The valves are operated by steel push rods, which receive their motion from cams on a half speed shaft, the push rods being provided at their lower ends with the usual cam rollers; the cam gear is of some interest, as it is of more than usual complication. Upon the forward end of the crank shaft is keyed a pinion A, which meshes with an intermediate pinion B secured to a short shaft journaled in a bearing on the crank case and the bearing in the gear case. The intermediate pinion B meshes with the gear wheel C on the cam shaft, which latter has twice the number of teeth as the pinion A.

Upon the hub of the pinion A is secured a larger pinion D, which meshes with the gear wheel E, the latter being employed for driving the circulating pump; to the intermediate pinion B is secured a bevel pinion F meshing with a bevel gear G secured to the lower end of a vertical shaft H. All the gear wheels so far mentioned are enclosed in an aluminum casing K at the forward end of the crank case, and in free communication with it. To the upper end of the vertical shaft H is secured a helical gear meshing with a similar gear on a shaft I running horizontally across the heads of the four cylinders, being journaled

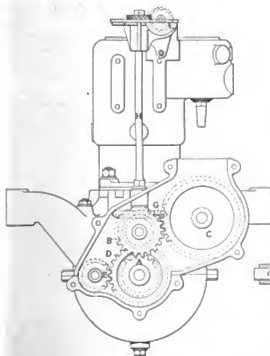


FIG. 1.—SIDE ELEVATION OF MOTOR.

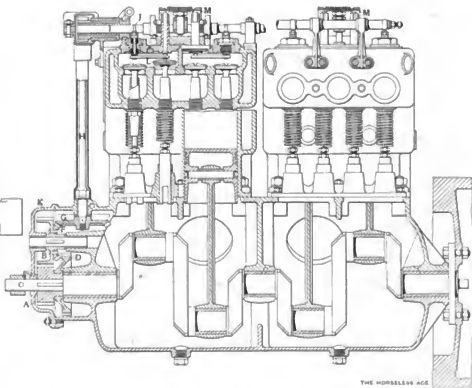


FIG. 2.—SECTION OF MOTOR.

THE HORSELESS AGE

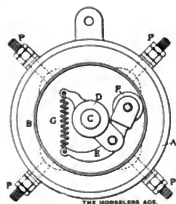


FIG. 4.—THE COMMUTATOR.

in bracket bearings secured to the cylinders. This shaft carries the ignition cams.

THE IGNITION SYSTEM.

The engine shown at the Madison Square Garden Exhibition was fitted with hammer break ignition, and this type of ignition device is shown applied to the engine in Figs. 1 and 2. In Fig. 2 J is the stationary igniter terminal, which passes through insulating bushings in a metal plug screwed into the cap over the exhaust valve. L is the movable terminal, which is periodically brought into contact with the stationary terminal by the ignition cams. The excess motion of the cams is taken up, and the return of the movable terminal is effected by means of coiled springs M, of which there are no less than eight on top of the cylinders.

More recently these engines are fitted with jump spark ignition, the outfit comprising a three cell storage battery, a quadruple induction coil with magnetic buzzers, a commutator and the usual spark plugs. The latter are screwed into the caps over the exhaust valves. The commutator is of a novel construction, and is shown in Fig. 4 herewith. It consists of a cylindrical metal case A, provided with a heavy interior lining B of insulating material, in which are embedded four metallic contact pieces, at equal angular distances from each other. These contact pieces are provided with threaded shanks P P P P, which project through the cylindrical metal case and form binding posts for making connection to the spark coils. To the shaft

C passing into the commutator box is fastened a bracket D, one arm of which carries a double armed lever E; the latter is provided at one of its extremities with a friction roller F, which is pressed against the insulating lining of the casing by a coil spring G, between the other end of the lever E and the second arm of the bracket D. As the shaft C rotates, the friction roller makes contact with the four metal contact pieces in succession, thereby leading the current successively into the primary windings of the four spark coils. The metal case is provided with a lug L, which is connected by a rod to the spark lever, by means of which the case can be rocked around its centre, to vary the period of the spark.

THE CARBURETOR.

The carburetor is one of the float feed, spraying type, but differs in a number of points from the usual constructions of this type; it comprises a float chamber A, in which is located a cork float B; into the latter is fastened a metallic stem S, which projects through a bearing in the cover of the float chamber and has fastened to it at its lower end a conical valve. The gasoline enters through the passage C, and when it attains a certain level in the float chamber the float rises and closes the valve at the bottom of the chamber. This float arrangement is a very neat and simple construction, doing away entirely with the usual balance levers and also obviating the possibility of leaks in the float, which are rather common with sheet metal floats. From the float chamber the gasoline passes through a passage P into the spray nozzle D, which projects into the warm air passage E. At the point where the nozzle projects into the passage the latter is contracted to increase the force of the suction. The mixture of air and gasoline passes from the passage E into a cylindrical chamber F, in which is located a form of double register valve containing two panels I and J, for closing the auxiliary passage H and the inlet passage G respectively. This valve is controlled by a pedal projecting through the footboard of the car. A spring ordinarily holds the pedal in its upmost position, which corresponds to a position of the throttle valve admitting a

minimum charge to the cylinder, which position is indicated in the drawing. If the driver desires to speed up the engine, he can do so by stepping on the pedal.

The British War Office has ordered a number of military motor wagons from the Austrian Daimler Company, in Wiener Neustadt, Austria.

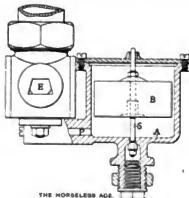
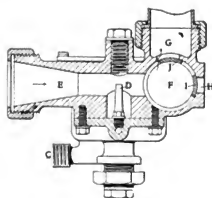
Das Schnaufferl, Munich, proposes that the great Chinese wall be reconstructed as an automobile track to hold future Gordon Bennett cup races on.

Siemens Brothers & Co., Limited, London, are introducing the Schiemann system of trackless trolley cars in England, the necessary current for their propulsion being taken from an overhead conductor, the same as electric street railways.

At The Hague, Holland, on August 2 an automobile containing four passengers failed to turn just before it came to a bridge, and dashing through the railings, fell into a canal. The occupants were rescued, and beyond the shock and the ducking they received suffered no damage. The car was afterward fished up considerably damaged.

Both the General Omnibus Company and the Road Car Company, of London, which own between them about 1,800 horse omnibuses, are, according to the *Daily Express*, arranging with the Daimler Motor Company, of Canstatt, to supply an installment of motor vehicles for experiment. Probably each company will begin with about twenty cars, and these proving satisfactory, no time will be lost in bringing motor omnibuses into general use.

The London Motor Express Company are establishing a service of four-wheeled motor driven hansoms equipped with 12 horse power gasoline engines and pneumatic tires; they are more roomy than the old hansoms, while stability is ensured by reason of their four wheels on a long wheel base. The fares will be precisely the same as at present, with the advantage that punched tickets will be used, ensuring only the correct fare being charged, thus saving the passenger from either overcharge or abuse.



FIGS. 5 AND 6.—THE CARBURETOR.

The Municipal Council of Fontainebleau (France), in conjunction with a committee of the business men of the city and surrounding localities, has decided to construct an automobile track around the famous Fontainebleau Forest. The track will be 55 kilometres (35 miles) long, 12 to 15 metres wide and of tarred macadam surface. All the roads leading into the forest will be either bridged or passed underneath through tunnels. There will be erected hotels, restaurants, garages, grand stands, etc., and several millions of francs are to be spent on the project.

COMMUNICATIONS.

The Whitman Transcontinental Tour.

DENVER, Col., August 8.

Editor HORSELESS AGE:

I will write you a line about our trip across the continent in an Oldsmobile. We have made the run—Ogden to Denver—since my last letter, in eight days, via Evanston, Granger, Rock Springs and Laramie.

We had much good luck and no bad breaks, except that a steering knuckle broke, and as we had an extra one along it was repaired in a few moments. As we were going slowly we were not thrown from our seats nor was any damage done.

We had spun down the long winding grades of the Rocky Mountain passes at a lively rate and if a wheel had come off on some of the steep inclines no doubt we would have had a nasty spill, and perhaps been thrown over the precipices. I will relate a little experience we had in the wilds of Wyoming, near Granger.

We left Evanston in the morning, hoping to make Granger or Green River by night, some 75 to 100 miles. In the afternoon we got lost and at dark found we were too far north. We had not seen a house, human being or any signs of life for 25 miles and concluded to stop where we were all night.

The country was simply sage brush plains, lofty mud hills and alkali beds. We pulled a quantity of sage brush roots and built a small fire, and making a windbreak of a small blanket we passed a miserable night. We found a small ravine about 2 feet deep, which we dug a little deeper with the shovel we carried. This partly protected us from the fresh wind. The night was dark and cold in this high alti-

tude of 7,000 feet, and as we had no extra clothing besides our leather coats we were kept busy pulling brush and tending the fire. To make it more pleasant, some twenty-five coyotes surrounded us in the near brush and howled by spells all night; at times all seemed to join in the chorus. We were glad to see the east light up, and after eating a crust of dry bread and taking a pull at our canteen we put back tracks over the previous day's route. After retracing 15 miles we got on to what looked like a trail in the direction we thought right, and after fording a branch of the Green River arrived at Granger at noon, where we did ample justice to the usual desert fare of fried bacon and beans and strong coffee.

This so far has been our only night in the brush. Often we had missed the road, but not to such an extent or such discomfort. The machine stands the hard work remarkably and we feel very well satisfied with our progress. I enclose a few photographs. We go from here to Omaha to-morrow.

L. L. WHITMAN.

The Simms-Bosch Magneto Ignition.

Editor HORSELESS AGE:

Will you kindly publish in the next issue of your valuable paper a full description with sketches of the Simms-Bosch magneto ignition apparatus?

JOHN GRAHAM.

[The Simms-Bosch magneto ignition system is shown in the sketch herewith. The magneto comprises a set of permanent magnets M M, with pole pieces P; a stationary armature A of the Siemens H type, and a pair of sectors B B of magnetic material, which are secured to a bracket



MAKING REPAIRS IN THE DESERT.

and mounted in such manner as to be capable of being rocked around the armature centre line. This rocking motion is imparted to the sectors by means of a lever arm C, a connection rod D and a crank pin fastened into the side of the cam K on the cam shaft E.

In the sketch the movable sectors are shown in their central position, which gives a very poor magnetic path from pole to pole. When the sectors are moved to the limit of their motion in one direction, the magnetism passes from the north pole of the field magnet through the sector adjacent to it into the top of the armature core and out of the bottom of the core through the other segment into the south pole of the magnet. When the sectors are at the other extreme of their motion the magnetic flux passes through the armature core in the opposite direction. Thus the direction of the magnetism through the armature is reversed twice during every revolution of the cam shaft, and each reversal sets up an impulse of electromotive force in the armature winding, but only one of these impulses is used.

One terminal of the armature winding is grounded to the magneto frame, and the other terminal is connected by a wire to the stationary spark terminal G, insulated



WATER AND MUD EXPERIENCES IN COLORADO.



PUTTING ON SAND TIRES IN THE NEVADA DESERTS.

from the spark plug F, which is fastened into the wall of the cylinder. The same plug also carries the movable spark terminal H. The latter consists of a lever arm inside the combustion chamber, fastened to a shaft passing through the plug F. To the other end of this shaft is fastened a bell crank J, to one arm of which is connected a coiled spring tending to bring the movable terminal H in contact with the stationary terminal G. These parts are, however, normally held apart by a stronger spring on the ignition rod I. When the rocking sectors of the magneto are in the proper position for producing a spark, the cam K raises the spark rod I (which allows the small spring to bring the two terminals in contact within the cylinder) and then trips it, causing the projection on the upper end of the spark rod to strike against the bell crank J and separate the movable spark terminal H and stationary terminal G within the cylinder, thereby causing a spark to be produced.

The period of the spark can be varied by the following arrangement: The spark cam

Now, if the machine has not been used for any length of time, and the fire appears to be all right, it is a pretty safe guess that the boiler is all right.

The next place to look for trouble is in the engine. Two of the most common causes for lack of power in the engine are leaky pistons and sprung crank shafts. To find out if the pistons are leaking, take off one cylinder head, then turn the engine over in the direction that the engine will run when the reverse is set in a certain position, until the piston has reached the bottom of the cylinder and begins to ascend. When it has reached a point about one-half inch from the head on the up stroke, set the brakes so the engine cannot turn and turn on steam. If the piston is leaky, steam will blow out of the top of the cylinder.

The operation can be repeated with the other cylinder, and if found tight the next move will be to inspect the crank shaft. The way to do this is to jack up both hind wheels, then hold some object, a stick or rule, for instance, so it just touches one tooth on the engine sprocket, and have some one pull both of the hind wheels over slowly. If the shaft is true each tooth will just touch the rule; if it is not true, only one tooth will touch. The only remedy for leaky pistons is new rings, or, if the pistons are solid, new pistons will have to be fitted. The same is true with a sprung crank shaft; it will pay much better to put in a new one than try to straighten the old one.

Another common cause of loss of power is sprockets out of line. Sprockets can be easily tested for alignment by stretching a string along the side of the large sprocket under the machine. If the two sprockets align as they should, the string will just touch the sides of both sprockets; if the sprockets are not in line, they can usually be lined up by adjusting the bearings on the axles. The writer has seen sprockets so badly out of line that the chain was badly worn on one side. The friction caused by this condition of the sprockets must be very great, and alone would cause the engine to lag.

There is one other source of loss of power in the running gear which is seldom looked for. This is the improper aligning of the back axles. Of course, the frame is sometimes sprung in use, but where axles are out of line they usually come from the factory in that condition. The writer bought a machine several years ago which seemed to run hard. On inspection the axles were found out of line one-sixteenth of an inch. The back arch was taken off and shipped back to the factory, a new one was sent out to replace it, and before putting it

in it was first tested and found out of line one-eighth of an inch, and this after a full explanation had been made to the factory.

The best way to make a test of the axles is to jack up the back wheels off the ground, then take out all of the slack in the axle bearings and turn over both wheels at the same time by hand; if the shaft is out of line the wheels will pull over hard in spots, and if the engine be started the differential gear will wobble on the axles. If the axles are out of line they can be usually lined up by springing the frame by trussing it, but this is not the best way to do it. The brazing should be taken out and the frame straightened and re-brazed. The above remarks refer more to steamers of the runabout class, though some of the above defects are common in larger autos of all kinds. AUTO KNOW.

Criticism from Abroad.

BELFAST, Ireland.

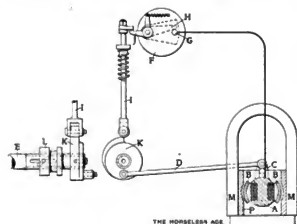
Editor HORSELESS AGE:

I was much struck by your excellent remarks on "Exports Falling Off," and your warning that while a demand exists on this side for moderate priced light cars the shipment of cars of inferior quality will destroy it.

I am afraid a large number of such inferior cars have already been sent. Consequently there is growing prejudice against American cars generally.

Nevertheless, about a year ago I ventured to purchase a petrol runabout of American manufacture. I bought it because my engineering instinct appreciated a touch of genius in the design of it and the principles adopted. But the carrying out of these principles—oh, the pity of it! A friend who has served his time in a high class English engineering works recently inspected it, and I pointed out to him things that ought to have shocked him. "Oh, well," he replied, "it's an American car, and when these things break you can make new ones out of other bits of tin quite as good!"

What hurt my feeling in this car is the incongruity of its construction. After making a cylinder, piston and valves of the most sufferable and satisfactory kind, an excellently ingenious transmission gear, an elegant body and a most comfortable form of suspension, they got tired and put in lubrication suitable for a wheelbarrow; ignition, water circulation and speed control arrangements of the order of engineering found in a penny toy. They seem to have forgotten the interdependence of things in a car, and when this penny toy arrangement fails there is no further use for the splendid cylinder and valves. There are only two moods of mind that suit the American car, either intense continuous anxiety over the penny toy parts, or one must regard it as a flirtation, a thing of numerous and unexpected possibilities. Afer a preliminary experience with my



THE HORSELESS AGE

SIMMS-BOSCH IGNITION APPARATUS.

K and crank pin for operating the magneto are secured to a sleeve at the end of the cam shaft E. The sleeve is held from rotating upon the shaft E by a pin passing through the grooved collar L, through a slot in the wall of the sleeve and into a spiral slot in the shaft E. As long as the shifting collar L is in a fixed position, the sleeve is immovable with respect to the shaft, but if the shifting collar L is moved longitudinally, it causes the sleeve, and consequently the cam K and the crank pin, to be moved angularly with respect to the shaft E, either advancing or retarding it, according to the direction in which the collar is moved.—Ed.]

Some Causes of Waste Power on Steam Autos.

Editor HORSELESS AGE:

We are often told that a certain auto is a hard steamer, or that the engine lacks power, when other machines of the same make and size appear to be all right.

car I christened her "Phyllis," after the old English ballad, which says:

"Phyllis is my only joy,

Fifful as the winds on seas,

Sometimes forward, sometimes coy,

Yet she never fails to please."

However, after a while the romance failed, and I got tired of her vapors. So I replaced the penny toy arrangements and bits of tin with as proper work as I could, and we now run with hardly a hitch.

It amused me to make these alterations, but they might not amuse everyone, and there are many who have not the means at hand to make them.

On the whole, I feel that if the makers of this car had taken a good rest after completing the really good parts and then applied their renewed and refreshed brains, together with about \$15, to the rest of it, they would have produced something that would have merited a whole hearted appreciation, which, as it is, the car cannot be expected to obtain. J. BROWN.

Spark Coil Troubles.

Editor HORSELESS AGE:

A few days ago, while out riding in my auto, I was caught in a shower, and in order to get home quickly I drove at a good speed. All at once the machine began to slow down and finally came to a full stop. It so happened that I had along with me a man whose business it is to repair automobiles and bicycles. We did not forsake the machine, although in a pouring rain. We examined all parts of the machine, especially the sparking plug. All things appeared to be in good order. The coil seemed to work all right, yet the sparking plug refused to spark.

While looking over the coil I discovered water on top of it between the two connections, and by turning over the balance wheel I saw a spark jump from one connection to the other, the water causing a short circuit. We took out the coil, wiped it dry and replaced it, and the machine started at the first turn of the crank.

To my mind it is highly important that the sparking coil should be located in a waterproof case. The old saying is that "necessity is the mother of invention." The coil in my auto was located in a small box directly under the seat, and in a position that made it difficult to get at the screws to arrange it. So, having a little spare time on my hands, I removed the coil and made a new box for it, setting the coil on end and locating it under the seat between the battery box and the front of the seat, so that the adjusting screws are in plain sight and entirely unobstructed when the cover of the box is lifted. I have had no trouble with water on my coil since.

In fastening my coil into the box I met with an accident which I thought would prove fatal to it. I put two screws through the side of the box and let them into the bottom of the coil; as the bottom proved to be much thinner than I thought it was, the screws penetrated several of the inside

layers, causing a short circuit. I took it to an electrician, who removed the bottom of the coil, and all of the perforated layers, and relaid them, changing ends so that each layer would overlap the hole in the other. When completed it worked as well as it ever did, and the expense had been only 50 cents. S. L. LEAVITT.

Two Piston Engines.

Editor HORSELESS AGE:

I thank you for calling attention to the error in my item on the two piston engine in your last issue. I dictated it in a hurry without re-reading, hence mistake.

What I had in mind was the high compression of the Cary engine, due to its long stroke; for instance, his engine having a 3 inch bore has a 10 inch stroke, the design of engine permitting this high compression without vibration, and the exhaust of this little engine without muffler is no more noticeable than that of a steam engine of the same size.

I am aware there is much prejudice against the two piston motor, but believe the Cary engine is simpler, has less fragile parts, and as much power per pound of weight as any off-set engine on the market. W. D. WOOLSON.

Spiral Piston Rings Not New.

Editor HORSELESS AGE:

I beg to inform you that spiral piston rings, as described by you on page 175, Volume XII, of THE HORSELESS AGE, are not at all a new invention. Such rings have been made in Germany for many years for stationary steam engines.

I have a well known German technical book which describes these rings and also how to machine them. They are made by the Duisburger Maschinenbau-Aktiengesellschaft of Duisburg-on-Rhein. The book referred to was published in 1892.

V. JAKOB.

Spring Suspension Query.

Editor HORSELESS AGE:

Please enlighten me as to the feasibility of putting brace rods from the angle iron frame down to the front axle, so that when the front wheel drops into a hole in the road it doesn't have a tendency to break off the front springs or to sever them from the boxes which are fastened on to the front axle. F. MALLICK.

[Whether brace rods can be used between the front axle and forward part of the frame of the car depends upon the kind of springs used. With side springs they could not be used, as they would prevent all spring action; with ordinary elliptic springs they might be employed, but it would be preferable to fasten the springs to the frame with a swivel joint.—Ed.]

When the entries at single entrance fees for the Motor Cycle Reliability Contest of the A. C. G. B. I. closed forty-eight machines had been entered, about one-half of them being of English manufacture.

Through Nevada.

(Concluded.)

Following is another chapter of the trans-continental tour in a Packard touring car:

On the way from Golconda to Battle Mountain a new source of annoyance had cropped out which was destined to haunt the tourists for many days. The soil was a little richer, it seemed, than farther back, for the sagebrush grew rank on the ridge between the wagon ruts, and the ridge itself was firmer and higher than in the more sandy regions which lay behind. The soil washed more easily, too, so that the road was crossed by numerous little runs rather than by a few large ones. Frequently the ridge reached up to the differential gear casing, and it became necessary to drive with much caution and sharp lookout for the high places, lest the car should get hung up on the gear casing with the drivers lifted from the ground.

This evil grew more pronounced in the course of Tuesday, June 30, when the start from Battle Mountain for Elko was made at 7:50 o'clock in the morning. The cyclometer showed 645 miles. One trail followed Humboldt River closely, but it was a dry weather track, and at this time was slippery from the recent rain, and the full river was overflowing in places. Once, forcing the machine out of a rut which was getting uncomfortable, the car for the first time slewed completely around right among the sagebrush, which here had a scattered growth. There was nothing serious in the little waltzing, as the ground was flat all around, but it warned the driver to use only the hill climbing gear in getting out of ruts and in all difficult places where alkali and a little moisture rendered the going unsafe.

As a matter of record it should perhaps be put down that before the start the gear box had been cleaned of its old lubricant with the little detriton from the new gears which had accumulated since the beginning of the trip, nine days before. The clutch also was tightened.

Leaving the bottom land trail, a low slope close by was struck where another trail wound its way among a profusion of large and small sharp stones which had been washed down from time to time from a rocky ledge above. To the right, below, magpies and water birds were swarming in and out of the low willow thicket along the narrow strip of river marsh. The scene was not altogether desert-like, yet so far as the eye could reach in the distance only sagebrush was visible; a large plain stone 300 to 400 square miles in extent, bounded by two low mountain ranges, and where the river and its little tributaries cut their beds into the ground could only be told within a stone's throw from its banks.

One of these tributaries is Rock Creek, which was to be forded, and the tourists had been told in Battle Mountain that it would be out of the question to attempt crossing it at the usual ford where the water was now as high as the banks. The

search for the upper ford, however, was interrupted by a tire leak. Investigation showed that the patch placed on the inner tube of the left front tire before Lovelocks had been applied with more hurry than skill, for it was the old puncture that leaked. The inner tube was replaced, not because it was necessary to do so, but because it was more reassuring, and a long day was ahead. In the further progress the differential case, the rear axle brace rod, and even the muffler grazed the stones in the road several times. Dodging one stone, sometimes another was hit, for Mr. Fetch's eye had not yet grown so keen in measuring this kind of obstructions as it

miles. It did not look very bad. True, the descent was at an angle of about 45 degrees, but in the middle there was a little bank of shale and stones, and the opposite shore was flat and sandy. The front wheels were cautiously let down in the water under brake action, and the depth was found less than 2 feet. But when power was switched on the car refused to move. The angle was so steep that all power was wasted against the bottom of the creek. A little pushing on the front wheels helped over this difficulty, and the opposite shore had been nearly reached when the front wheels struck a stone or shale ledge in the creek bottom, perhaps

The distance to White House from the ford was only about 6 to 8 miles, but through the inexperience of the pilot it became 20, most of it over a very fair level wagon track running straight as an arrow through sagebrush from north to south, after having first followed the northern range of hills too far. The flat which was thus crossed was found to belong to the Dumphy horse and cattle ranch, which includes an area of 187,000 acres. The ranch buildings were reached at 1:25 o'clock, and there dinner was served by one of the Chinese cooks who do this work in hotels and on ranches all over this portion of Nevada. To their national traditions is



AT GLENWOOD SPRINGS, IN FRONT OF COLORADO HOUSE.



ON THE ROAD TO GLENWOOD—UNDER AN OLD FLUME.

became in the course of the following few days through Nevada and Utah.

Here, too, was found the first use for the shovel when the car was steered into ruts from which there was no exit, except by backing up a quarter of a mile. In front the brush grew so stout on the ridge between them that the machine could not be dragged through. But the shovel saved the situation. Presently a coyote made his appearance, contemplating the tourists from a distance of about 100 yards with great composure. Bullets from two revolvers missed the mark, but made him scamper.

At 11 o'clock the Rock Creek upper ford was reached, the cyclometer showing 675½

8 or 10 inches high. It was necessary to back up and steer a new course; and this could not be accomplished without a man at each front wheel to help. Wet feet was the natural result, as Mr. Fetch had on the only rubber boots in the outfit, and he guided the car from the side, walking in the water.

This was one occasion when the presence of a third man seemed convenient, and yet the experience throughout would rather bear out the contention that two may get through difficulties as easily as three, or a little more easily, the main point being to adapt the means for avoiding the trouble to the circumstances.

due the fact that eating hours are strictly observed. Arriving after the regular meal time one can get nothing to eat until the bell rings again.

From the Dumphy estate at White House to Carlin the road leads between two portions of one mountain cut in twain to the bottom. At least this is the way it appears for part of the distance, where a small creek bores its way through a narrow, almost level canyon, which connects comparatively flat heather on both sides of the range. Before entering this pretty diversion in landscape the car was stalled, however, on one of the road ridges. This was at 2:40 o'clock, shortly after leaving

the ranch. The cause was the usual one: the ridge was higher than it looked, caught the rear axle brace under the differential gear case and turned it around the axle until the upper crosspiece of the case frame bore down upon the sprocket chain. In twenty minutes it was all twisted back to its place and the set screws tightened, but the chain had been weakened by the irregular strain, and at 4:15 o'clock it came nearly apart on another similar ridge, and four links had to be replaced with new ones. This operation, and again straightening the rear brace, required forty-five minutes, being finished at 5 o'clock. The cyclometer showed 713. While this was going on

miles was through a canyon rising to an elevation about 500 or 600 feet above the surrounding country. The rest was said to be smooth, good road downhill to Elko and parallel with the railroad. The tourists took the chance of getting through the hills during daylight and making the last 14 miles by lamps, and in this they barely succeeded. The last two miles of the mountain seemed a trifle uncanny, being rough and steep and appearing more so in the darkness, which was fast settling around them. They almost overlooked a little stack of cut-off sagebrush which had been placed at one side of the forking trail, and which Carlin people had told them

used the third speed was thrown in and Elko reached at 9 o'clock, just 1½ hours after leaving Carlin. The cyclometer indicated 753 miles, the barometer 24.80, or an elevation of 5,050 feet.

ELKO TO WELLS.

Frequent driving over virgin trackless ground through the sagebrush, to avoid the deep ruts, had filled every accessible interstice in the car's mechanism with ground up twigs. The gear lever quadrant was choked with coarse pulp, and the lever for the side brake and clutch was impeded by it. Longer twigs were wedged in wherever they could find lodgment. The underside of the muffler was polished like a shining



"Tom" Fetch in "Old Pacific."



IN THE HEART OF THE GRAND CANYON.

the car stood on the sharp incline where the incident occurred, nose upward, and when ready to start again the carburetor had been flooded by reason of the increased head of gasoline fed by gravity from the tank in the front boot. It had been neglected to turn the gasoline off when the repair was begun. Most of the little temporary troubles came about through just such inadvertencies, but rarely caused delays of more than a few minutes.

Carlin, a pretty little town on the railroad—all towns in Nevada are on railroads—was entered at 7:30 o'clock, and it seemed evident that Elko, 28 miles farther, could not be reached before dark. The first 14

meant that here they had better turn off onto a hogback slope, which would be safer for a night descent into the valley than the lower pass. The hogback was found pitched just about right for gentle coasting, though its width was hardly more than 15 yards and sufficiently irregular in outline and surface to call for sharp attention to the steering. If the lamps had been lighted in this place the shadows would probably have been more confusing than the light could have been helpful. Finally the good road was reached, however, and here the headlight, when lighted, showed a plain course, and after a little hesitation to find out whether it was all that it prom-

kettle; the paint rubbed off the underside of axle and braces, and the wooden handle of the shovel, strapped underneath, was furrowed from the whipping it had received. Later on, in Utah, it was actually whipped into shreds, and it became necessary to buy a new one.

For this reason a cleaning out process preceded the departure from Elko on the following day, Wednesday, July 1, while the tourists were waiting for the post office and express office to open their doors.

The tires were still in good condition, though beginning to show the canvas on the inner sides where the rubber was being gradually ground off. The treads and the

outsides of the tires remained intact, and this was due to the fact that almost the entire wagon traffic in the States west of Colorado, small as it is, is with vehicles of 5 feet wheel gauge, while the car is of standard gauge, or 4 feet 8½ inches. With one tire squarely in one of the ruts, the other tire would drag against the inner edge of the other rut, and whenever that edge consisted of hard baked alkali marl—turned up in the first place where the soil was wet—the grinding action was rapid and severe. And the car would naturally wobble from one rut to the other according to the slope of the surface, so that both front tires were ground about evenly. The rear tires, being more rigid in relation to the body and weight of the car, escaped some of this action. Eleven miles out of Elko the rear axle brace was dislocated again while going down a steep and sandy hill, but by this time a quick method of remedying this recurring inconvenience had been discovered. It consisted simply in jacking under the front arm of the brace until the weight of the car, bearing down on the rear axle, turned the brace back to its correct position.

Eighty-four degrees in the shade and 115 in the sun (mercury thermometer) did not seem excessively hot, but with the wind from behind—what little there was—and a series of sand hills to overcome, the cooling water came to a boiling point two or three times, but in these as in other cases previously referred to it should be remembered that the altitude lowered the boiling point of water considerably while reducing the capacity of the atmosphere for carrying away the thermal units.

There was a certain grim variety in the landscape. The sand hills had the snow clad Ruby Range for background. After the laborious climbing often followed a long coasting with no other brakes required than the resistance of the soil. Then again spots were found where desolation reigned supreme; nothing visible within the confines of the hills but a dreary expanse of stony ground with a scant vegetation of sage, greasewood and several varieties of other mean plants whose names we never learned. Presently a shallow slough was encountered, 18 miles out of Elko, where little pools of stagnant water oozed out of the white, barren ground, impotent to fertilize it here where the alkali was combined with gravel rather than with clay.

Nineteen miles more of similar country and Deeth railway station was reached, which is said to be the coldest place in Nevada.

When the distance was to be read the cyclometer was found broken. Estimating the last few miles since the previous notation, it should have registered 700 miles at Deeth.

Nothing at Deeth indicated that a fertile valley was near, yet a few miles by a road winding around low hills brought the large and prosperous Siar Valley settlement into full view. One of the first buildings along the road was a meeting hall for the order

of Good Templars, and it seemed that the whole colony belonged to this order; in fact, that the Star Valley had been taken under cultivation as a matter of lodge enterprise. The homely habits of aque potores (water drinkers) explained why Deeth received so little benefit from their proximity, but in the settlement itself thrift was certainly visible everywhere, whether it was mainly due to the well organized irrigation of the fields or to the abstention from irrigating the inner man with stronger liquor. Well fed horses and cattle, large fields of alfalfa and smaller patches of grain greeted the eye in every direction. A special feature was the houses built of discarded railway ties with reddish marks from rails and spikes, bearing witness to the economy practiced in the early beginnings. The ties, it was said, had been sold by the railway company for 5 cents apiece. The road led up and around the side of the mountain from which the melted snow serving for irrigation ran down in numerous rivulets crossing the road every hundred feet to be intercepted in a main ditch skirting the road on the left. Most of the streams had stony beds, but a few were soft, and in one of these the car was unexpectedly mixed so deeply that it required a half hour of hard work with the jack, the shovel and some fence posts to get under way again. The soft spot in this case extended over a distance of about 2 rods, and had been made passable for light wagons by dumping straw and malodorous refuse, but the machine, weighing with its load over 3,000 pounds, cut through this "improvement." Most of the 23 miles from Deeth to Wells the road circled around the mountain referred to, with the Star Valley circling with it on the left, and the rivulets continued to cross the path. The elevation of the road was found to be 5,625 feet at 3 o'clock. At 5 o'clock we arrived at Wells, so called because in the vicinity of this town are the wells or springs from which Humboldt River takes its beginning.

The Highway Alliance.

The Highway Alliance, 11 William street, New York city, has just issued a new number of its publication, "Highways." By an act passed by the New York State Legislature on May 14 last the alliance was authorized to elect its officers by mail. The next annual meeting will occur on the 7th of September, Labor Day, at Valhalla, near the eastern end of the longest piece of road constructed by State aid. This road begins at North White Plains, and continues through Valhalla, Armonk, Bedford, Cross River, Salem, Purdys, Somers Center, Yorktown Heights, Briarcliff, East View and Elmsford to Ardsley.

According to E. Sauvage, the quantity of air necessary in the combustible mixture of an explosion engine to obtain the best power results is about 1.6 times that theoretically required to completely burn the gasoline introduced.

Club Notes.

AUBURN A. C.

At a recent meeting of the Auburn (N. Y.) Automobile Club committees on membership, contests and runs, laws and ordinances and good roads were appointed, and it was decided to employ an attorney to look after the members' interests. The club is trying to make arrangements to attend the State Fair on "Automobile Day."

SYRACUSE A. C.

The club proposes to hold a race meet at Syracuse on September 12 next and has secured the sanction of the A. A. A. Two or three match races are in view, which are expected to prove of considerable interest. The meet will be held in connection with the New York State Fair, and a very large attendance is expected.

RHODE ISLAND A. C.

The third annual race meet of the Rhode Island Automobile Club will be held at Narragansett Park, Providence, on the afternoon of September 19. The committee of arrangements is making elaborate preparations, and the list of prizes will be very tempting. Classes will be arranged to suit machines of every power; also special speed trials and match races. Entry blanks may be secured from H. H. Rice, secretary, Crown Hotel, Providence.

A. C. OF BRIDGEPORT.

An automobile parade will be held at Bridgeport, Conn., on August 31 as the initial event of the city's "Old Home Week" celebration. The Automobile Club of Bridgeport of sixty-five members will participate. The committee, of which A. L. Riker is chairman, cordially invite all automobilists to take part. The Automobile Club will afford visitors every facility. A committee was appointed at the last meeting of the Automobile Club of Bridgeport to arrange for an automobile race meet at Seaside Park immediately after the parade.

Berkshire A. C.

The Berkshire Automobile Club, of Pittsfield, Mass., last week held an outing at Cheshire, a feature of which was a steamed clam dinner. A hill climbing contest followed, which resulted as follows: Steam class—First, Dr. O. S. Roberts, Grout, time, 23½ seconds; second, E. H. Kennedy, Grout, 28 seconds; third, G. F. Hall, Toledo, 33 seconds; fourth, G. S. Hubbard, Locomobile, 34¾ seconds. Gasoline class—First, Franklin Weston, Winton touring car, and Judge E. T. Stocum, Stevens-Duryea, 33½ seconds; second, C. C. Chesney, Stevens-Duryea, 37½ seconds; third, John H. Noble, Oldsmobile, 68 seconds. The prizes were handsome cups offered by the Berkshire Automobile Club. The officials of the meet were: Timers, Dr. O. S. Roberts, Dr. F. A. Robinson; judge at finish, Dr. F. W. Brandon, and scorer, L. W. Harger.



The Lockwood Manufacturing Company, of Newark, N. J., has secured the agency for the Flint roadster.

A line of automobiles in connection with the Bangor and Brewer electric cars has been installed at Bangor, Me.

A. H. Funke informs us that Dr. Jackson used one of his No. 15 "autolytes" on the recent transcontinental tour.

A two story brick automobile house will be built for William Tutelman at 3214 Columbia avenue, Philadelphia, Pa.

We are informed that, contrary to a statement in our last issue, it was never intended to bar foreign cars from the endurance contest.

As we go to press the meeting of the Association of Licensed Automobile Manufacturers is being held at the International Hotel, Niagara Falls, N. Y.

Tyndall Palmer, of New York, is said to be in correspondence with the mayor of Davenport, Ia., with the object of locating an automobile factory there.

Automobiles promise to play an important part in the Ohio political campaign next fall, both of the prospective candidates having invested in touring cars.

It is reported that the Pope Motor Car Company has under consideration the opening of the Crawford bicycle works at Hagerstown, Md., as an automobile factory.

The board of managers of the Wisconsin State Fair has decided to hold an automobile race on September 9 to which all American machines will be eligible. The prize will be a purse of \$1,000.

W. R. Pennington, of Broken Bow, Neb., writes us that he tried a kerosene burner on a steam car, but it proved too troublesome; he is now using gasoline with the same burner, with perfect satisfaction.

An automobile in which Rev. J. H. MacDonald and Joseph R. MacGlashen and their wives are making a trip from Chicago to Boston ran into a barbed wire fence near Laporte, Ind. The women were severely cut and the machine was incapacitated for pursuing the journey.

A call has been issued by members of the Alpha Motor Cycle Club and the New York Motor Cycle Club for a meeting to be held at the clubhouse at 33 Grant square, Brooklyn, N. Y., on September 7, for the purpose of forming a national association of motor cyclists.

Walter Hansel, Charles Merrill, Frank P. Adams, C. A. Toal and W. H. Snyder have organized a company with \$25,000 capital stock to build a garage at Stockton, Cal., next fall. Temporary headquarters have been secured with Merrill & Hansel, on South San Joaquin street. Agencies for the Stevens-Duryea, Olds,

Cadillac and Winton machines have been secured.

Work has been begun on a new automobile factory for Kalbfleisch Brothers, of Stratford, Ill.

The agency for the Autocar for Terre Haute, Ind., has been secured by the Chaney Automobile Company.

A press report states that an automobile company with a capital of \$1,000,000 is about to be organized at St. Joseph, Mich., to build automobiles of the Mercedes type.

The Seely Manufacturing Company, of Pittsburg, Pa., has been reorganized as the Standard Automobile Company. The new officers are W. N. Murray, president, and R. R. Gordon, secretary and treasurer. D. N. Seely has retired.

On August 15 a meeting was held at Cleveland, Ohio, by prospective subscribers to the treasury stock of the General Automobile and Manufacturing Company in an effort to effect a reorganization, but our advisers state that nothing definite was decided upon.

From Minneapolis comes a report that, although 30 licenses have been issued in that city for automobiles, few automobiles can be found in the assessment lists. Many of the autos are thought to have been purchased after the assessments were completed, but the assessor thinks that he will find many machines next year.

The proposed automobile meet at Columbus, Ohio, on August 29 has been declared off temporarily by the Automobile Club because the club declined to pay 40 per cent. of the receipts demanded by the Driving Park Company for the use of its park. The race will now probably be held under the auspices of the Driving Park Company on Labor Day.

The old brick church at Jefferson avenue and Ormond place, Brooklyn, N. Y., which has been remodeled as a garage by the Ormond Automobile Company, was opened for business on August 10. The building has a floor space of 8,000 square feet, a reception room for women, 125 lockers, and an electric charging plant capable of charging six machines at the same time.

Banker Brothers Company, of Philadelphia, Pa., report automobile sales for the week ending August 15 as follows: Autocars to Charles A. Parsons, of Morrisville, Pa.; Alexander Allan, of Chestnut Hill, Pa.; D. E. Ford and Alexander R. Harper, of Philadelphia; Pierce Arrow to Dr. H. L. Northrop, of Philadelphia, and Buckboard to the Seashore Machine Works, of Atlantic City, N. J.

A course in constructing, caring for, handling and repairing all kinds of automobiles will be included shortly among the educational features of the Y. M. C. A., of Boston, Mass. Present plans divide it into three sections, the first consisting of twenty-four illustrated lectures, open to both men and women; the second, of a complete draughting course, and the third, of instruction in the operation and adjustment

of automobiles and engines, the two latter open to men only.

J. C. Glidden, of Boston, in his automobile tour north through Sweden entered the Arctic circle at 2 o'clock on Sunday last.

A St. Joseph, Mo., automobilist complains of the high taxes to which motorists are subjected in that locality—eight times as much as is paid on a horse and buggy. They pay a State license of \$2 per year, \$2 for a license in every county the auto enters, and personal taxes on them to both the city and county.

Following was the program of the annual convention of the Interstate Automobile Association of Missouri and Kansas, held at Kansas City, on August 15 and 16: Saturday forenoon, a tour of the boulevards of Kansas City; Saturday afternoon, an automobile hill climbing contest at the hill east of the Blue River on Independence avenue; Saturday night, association meeting; Sunday, a tour of the rock roads of Jackson county.

D. T. Ray, of San Francisco, is reported to be in the Yosemite Valley in behalf of the Southern Pacific Railroad and the Yosemite Stage and Turnpike Company, investigating the possibility of establishing an automobile line between Raymond and the Yosemite. He is said to be engaged in placing automobiles on all stage routes for carrying the mails for the Southern Pacific lines, and to have recently established such a line between Sodaville and Tenopah, Nev.

Greuter and Matheson Consolidate.

The Holyoke Motor Works, of Holyoke, Mass., have been consolidated with the Matheson Motor Car Company, Limited, of Grand Rapids, Mich. A touring car of new design with a 32 horse power four cylinder vertical motor is to be manufactured. The motor and transmission gear will be made at the Holyoke works, and the cars assembled at Grand Rapids. Among the special features of the new car are the following: Both inlet and exhaust valves are mechanically operated, and the former are located in the cylinder heads; ignition is of the make and break variety, and the cans for operating the igniters, the inlet and the exhaust valves are all arranged on the same shaft. A positive feed carburetor is employed. The change gear is of the individual clutch type, and gives three forward speeds and one reverse, the clutches being self adjustable. All changes of gear are obtained by means of a single lever. The car has irreversible wheel steering, hub brakes, etc.

"When it comes to sandy places, I am going to put in a gear of 4 to 1, which I can throw in under such circumstances, and which will give me 120 horse power of torque, and I will go right through that sand and leave them away behind!"—From an alleged interview with Mr. Edison in the *Electrical Review*. The italics are ours.

LEGISLATIVE AND LEGAL.

Orlando F. Weber, an automobile dealer of Milwaukee, Wis., who was recently fined \$5 and costs for operating a machine at excessive speed, has appealed.

George Hill, of Mahwah, N. J., and Robert Wallach, of New York, were each fined \$10 and \$1 as costs at Hackensack, N. J., on August 8 for operating their automobiles without the necessary State license.

A bylaw regulating automobiles, which will be adopted by the Winnipeg city council, limits the speed to 10 miles an hour and at crossings to 4 miles an hour. Stopping when a horse becomes frightened is left to the discretion of operators.

The city council of Martinsburg, W. Va., has passed a law limiting automobiles to a speed of 8 miles an hour, and has instructed the police to enforce it against those who recklessly run their automobiles within the city limits.

Up to August 9 3,400 automobilists had registered under the New Jersey law. Among them is W. Bell Winslow, of Pasadena, Cal., who intends to make a transcontinental tour next fall, starting from San Francisco in a race against time.

The Automobile Club of Louisville, Ky., has requested that the ordinance which will be introduced in the council next month shall provide for a special speed limit, regulated according to the density of the population along the streets traversed.

The arrest of George H. Hunt, of Hartford, is said to be the first under the new Connecticut registration law. He failed to display the number on his automobile, but as he has since complied with the statute the case has been nolle prossed.

It is reported that the council committee of Youngstown, Ohio, has practically decided to recommend that the speed of automobiles be limited to 7½ miles an hour through the business district and to 15 miles through streets three-quarters of a mile from the business centre.

Andrew Terhune, of Asbury Park, N. J., has brought suits aggregating \$20,000 against William E. Wolff, of New York, for injuries sustained about six months ago by his daughter, wife and self in a runaway, said to have been caused by defendant's automobile.

The board of supervisors of San Diego County, Cal., has passed a new and more stringent automobile ordinance. No maximum speed is established, but it must be "reasonable and proper"; chauffeurs must stop when signaled; machines must be equipped with horns or bells; in passing domestic animals driven by a person automobilists must take the outside of the grade without reference to the right or left of the road; fines of not less than \$25 nor more than \$100 or from

fifteen to thirty days' imprisonment for violation are provided.

An ordinance limiting the speed of automobiles to 10 miles an hour in West Chester, Pa., has been introduced in the borough council.

The Lawrence (Kan.) council has refused to pass the proposed ordinance putting a 20 mile an hour limit on the speed of automobiles. The limit was placed at 6 miles an hour on the business streets and to miles on the side streets.

In an answer filed by the corporation counsel of Chicago in reply to the bill of A. C. Banker, asking for an injunction restraining the authorities from arresting him for failing to procure a license, it is admitted that orders have been issued for Banker's arrest. The answer in substance says that he has to be arrested because he habitually runs his automobile at illegal speed.

New Incorporations.

The American Automobile Company, of St. Paul, has been organized at Huron, S. Dak. Capital, \$250,000.

A new automobile manufacturing company has been formed in St. Louis, Mo., and will establish a plant there. The officers are: C. H. La Flamboy, president; George L. Aldrich, vice president, and C. B. Crandall, secretary.

The American Touring Car Company has been incorporated, with a capital of \$100,000, to make automobiles; the incorporators are John H. Fogarty, Daniel Fogarty, Margaret E. Flaherty and William H. Flaherty, all of Brooklyn, N. Y.

The Continental Motor Vehicle Company has been incorporated at Camden, N. J. The capital is \$100,000 and the incorporators are Daniel M. Plantz, Henry S. Mansfield, L. Charles Bechtle, William F. Robinson and Robert C. Taylor, all of Camden.

The Automobile Livery, Tours, Sales and Storage Company has been incorporated by Carl Thorden, Herman J. Hass, Julius M. Edsall, Albert B. Shultz and Walter H. Van Deusen to conduct an automobile livery at Buffalo, N. Y. The capital is \$25,000.

Trade Literature Received.

Searchmont Automobile Company, Philadelphia.—"What Others Say."

National Oil Heating Company, Melrose, Mass.—Catalogue of the National kerosene oil burner.

Smith Automobile Company, Topeka, Kan.—Descriptive pamphlet of a gasoline car built by the firm.

H. W. Johns-Manville Company, 100 William street, New York.—Circular on "Anti-Sweat" pipe covering.

Wm. Lintern, of West Park, Cuyahoga County, Ohio.—Circular of a pneumatic and mechanical sander for automobiles.

Duryea Power Company, Reading, Pa.—"Pleasant Driving," a circular setting forth the advantages of single lever control.

PATENTS..
MOTOR VEHICLE

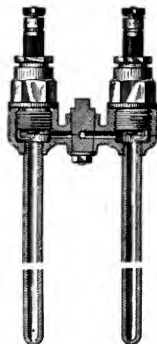


United States Patents.

735,213. Electrical Ignition Apparatus.—Walter H. Cotton, of Chicago, Ill. August 4, 1903. Filed February 28, 1902.

The object of the invention is to prevent the sooting of the spark points. Provision is also made for effectually dislodging the spent gases or products of combustion from the neighborhood of the electrodes, so that the explosive mixture of each compressed charge will be permitted a free circulation around the electrodes and a uniform and regular ignition insured.

The invention further contemplates an arrangement of two sets of sparking de-



No. 735,213.

vices designed to be thrown alternately into service, so that in case of an accident to one pair of the electrodes or any of its parts the igniting device thereof may be thrown out of service and the other employed.

The invention comprises a pair of sparking chambers, in each of which is located an igniting device, a connection between the sparking chambers and the cylinder of an explosion engine, a valve in the connection for opening communication with the chambers from the cylinder in alternation and an auxiliary gas chamber for and communicating with each of the sparking chambers.

735,015. Manufacture of Electric Igniter.—Albert De Dion and Georges Bouteau, of Puteaux, France. July 28. Filed September 10, 1902.

Relates to a spark plug. Only the insulating porcelain core and parts support-



No. 735,015.

ed thereby are shown in the drawing. The porcelain core is provided with a longitudinal hole through which passes a metal conductor soldered to a cap of copper or other metal. The cap of copper is soldered to the core of porcelain by solder consisting of an alloy of 85 per cent. in weight of copper and 15 per cent. of aluminum.

734,826. Electric Battery.—Henry Csäyi, of Felső-Dobsza, Austria-Hungary. July 28, 1903. Filed March 4, 1903.

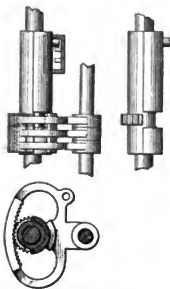
The cell has carbon and zinc electrodes separated by a porous diaphragm.

The carbon electrode is immersed in nitric acid of, for example, 40° to 50° Baumé and the zinc electrode in alcoholic solution of, for example, 5° to 15° Baumé strength of pernitrate of mercury and potassium cyanide. As an example of a suitable composition for said alcoholic solution, the following is given: One thousand grams of alcohol of 25 per cent., 150 grams of nitric acid of 48 per cent., 10 grams of oxide of mercury, 6 grams of potassium cyanide solution of 60 per cent. The depolarizer is separated from the solvent liquid by a very porous diaphragm—for example, a partition of fire clay or the like—which may be formed of a mixture of clay and pieces of carbon, which latter have been burned by heating the mixture.

735,074. Sparking Igniter for Explosive Engines.—William C. Matthias, Reading, Pa. August 4, 1903. Filed January 29, 1902.

735,456. Variable Speed Mechanism.—H. Bartol Brazier, of Philadelphia, Pa. August 4, 1903. Filed August 13, 1902.

The gear is of the "clash" or sliding type and the improvements relate more particularly to the operating mechanism. There are two sets of shifting pinions and one



No. 735,456.

sliding clutch member, which are independently movable along their shafts by means of a single operating device. The sliding members of the change gear are connected by means of grooved collars, shipper forks and rods to three gear sectors at the lower end of the gear operating shaft. A gear pinion at the lower end of the operating shaft can be put in mesh with any one of these sectors by shifting the shaft in the direction of its axis. Owing to a pin in the shaft, and guiding flanges between which the pin moves when the shaft is rotated around its centre, the latter can only be shifted when in its medium position, the guiding flanges being cut away in the middle enough to let the pin pass. The two sectors with which the pinion is not in mesh are firmly locked in position by means of cams carried on the lower end of the operating shaft, as clearly shown in the sketches herewith.

735,505. Charging Device for Electromobiles.—Caryl D. Haskins, of Schenectady, N. Y. August 4, 1903. Filed December 4, 1900.

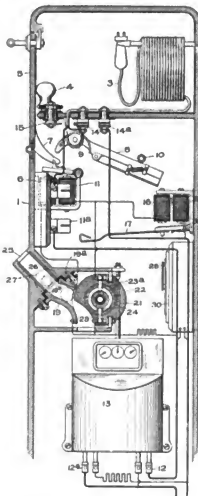
The invention broadly comprises a pair of circuit terminals adapted to be connected with the storage battery of an electrically propelled vehicle and means for permitting transmission of current to the vehicle only after a prescribed plan of procedure has been followed, by which the delivery is limited to authorized customers. The device is made for either direct or alternating current circuits; in the latter case a motor generator located close to the generating station is automatically thrown in circuit when the toll is paid. The drawing herewith shows the charging post adapted for continuous current circuits.

In the figure 1 represents a cast iron casing adapted to be secured to the side of a building. It is divided by a transverse partition into two chambers, the upper of which is provided with a duplex flexible conductor 3, coiled on a bracket or pin, as shown, and ending in terminals suitable for making connection with the charging terminals of the vehicle. This upper chamber contains also a switch handle 4, access to which is governed by a hinged door 5.

The lower chamber contains all of the automatically controlled mechanism for insuring connection of the cable 3 with the supply service. The switch controlled by the handle 4 is also instrumental in governing the delivery of current to the cable 3, and being hand operated permits the cable to remain dead even after the door 5 has been released and the cable withdrawn until all of the connections are established and the apparatus is in condition to permit a charge.

The door being opened, the switch handle 4 may be pulled out, thus rendering the cable alive and permitting the charging to proceed. Before the door can be opened, however, coin must be fed to the machine, by which a releasing electromagnet 6 is energized, withdrawing a stop from an arm 8, forming a rigid part of the

door. In the path of the arm 7 is an extension of a switch lever 8, controlled by a spring 9, which is normally held by said spring against a cushioned stop 10. When the door is opened, this switch blade is forced into a pair of spring clips 11 11^a, one of which is in connection with one of the service wires through two terminals 12 12^a, between which is included the series coil of a recording wattmeter 13. The other switch clip is connected with one of the duplex conductors of the cable 3, the other of said conductors being connected with a terminal 14, a switch blade 15 within the lower inclosure, but governed by the handle 4 in the upper inclosure, being adapted to



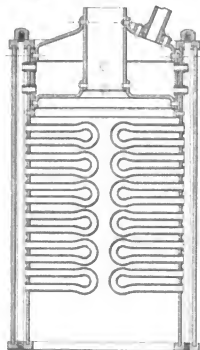
No. 735,505.

cross connect or bridge this terminal 14 with a companion terminal 14^a, connected with the other service wire of the distributing system. The switch is locked in this position after closure by means of an electromagnet 16, the armature 17 of which drops behind the switch lever, and locks the latter in its closed position so long as the electromagnet 16 is energized. The releasing and locking electromagnets 6 and 16 are included in branches of a circuit across the mains.

This circuit includes also two normally open points in parallel relation, one in the coin channels governed by the introduction of a coin and the other governed by the

operation of the meter. The coin channel contains two ducts side by side, which communicate with two independent metal terminals 19¹⁹, the latter carrying a light spring contact 19², adapted to be engaged by a coin when introduced into the duct, as indicated in dotted lines, forming an electric bridge between the contacts 19¹⁹, and thus completing the circuit across the mains, which include the magnets 6 and 16.

The rotary element of the meter carries an external shaft on which a worm 21 is mounted, gearing into a wheel or wheel train operating a disk 22, which in its normal position obstructs the transit of a coin to the cash box, but which when turned by the meter permits the coin to fall. The arrangement shown in the drawings comprises a disk with a segment removed from its edge, by which after a determinate range of movement the coin is freed and may fall into the box. During this range of movement a brush 23, nor-



No. 735.597.

mally bearing on the insulating spot 24, rides upon the conducting face of the disk and establishes a cross connection with a corresponding brush 23², completing the circuit between the mains, including the magnet 16, independently of the coin branch. The parts are so arranged that this branch is completed before the coin is permitted to fall, thereby holding the switch 8 closed by the locking armature 17. The gearing between the worm 21 and the disk 22 is of such a ratio that the ring containing the insulating spot 24 will have made one complete revolution and opened the locking circuit only after the value of the prepaid coin in current has been delivered, upon which the armature 17 is drawn back by its spring and the switch 8 automatically opened. Thus current is automatically cut off from the vehicle after the prepaid amount has been

delivered. Although the door is still open, it will be impossible on the part of the driver of the vehicle to procure a further charge or for any other driver to effect an active relation to the circuit until toll has again been paid. When the door is closed, the armature of magnet 6 being released locks the door in a closed position.

735.275. Steam Generator.—Frederick Lamplough, of Willesden, London, England. August 4, 1903. Filed December 14, 1901.

Relates to a generator on the water tube principle, with the water tubes so arranged that they provide circuitous courses for the water and lie in substantially vertical planes, so that the products of combustion arising from a hydrocarbon oil burner will be able to act upon the entire external surface of the tubes, which would not be the case if the tubes occupied a horizontal or inclined position. The water tubes are so connected one with another through suitable boxes or nipples or through passages in the tube plates that the water will circulate through the tubes in succession as though they comprised one continuous tube. At or near the upper part of the generator is provided a steam collector, comprising a series of horizontal or slightly inclined tubes, into which the steam generated in the water tubes can enter and be stored ready for use in the motor. An important feature in connection with these steam storage tubes is the manner in which they are mounted in tube plates and communicate with one another without the use of riveted joints.

735.597. Steam Generator.—F. W. Schirmer, of Anbonne, Switzerland. August 4, 1903. Filed April 4, 1903.

This steam generator is of that class in which steam is generated very rapidly, and which are therefore especially adapted for use in connection with the motors of automobiles. The generator comprises outer and inner concentric cylindrical walls, rings having concentric circular recesses, into which the ends of said walls are fitted, bolts for holding these parts together, water tubes secured in the inner cylindrical wall, a steam dome in the upper part of the generator, a smokestack passing centrally through the same, a steam pipe leading from the steam dome, and connections from the interior of the steam dome to the upper portion of the space between the said concentric cylindrical walls.

735.627. Explosive Engine.—William Walke, of Joplin, Mo. August 4, 1903. Filed February 26, 1903.

734.529. Elastic Vehicle Tire.—Henry G. Fiske, of New York, N. Y. July 28, 1903. Filed May 17, 1899.

735.808. Composition of Matter for Battery Electrolytes.—William Peto and James W. T. Cadett, Ashlead, England. August 11, 1903. Filed March 14, 1903.

As a semi-solid plastic electrolyte of a pastelike consistency for electric accumulators a composition of matter consisting of powdered or precipitated sulphate of

lead moistened with dilute sulphuric acid and thoroughly mixed together, the strength of the acid being varied.

735.812. Vehicle Wheel.—Edward H. Phipps, New York, N. Y. August 11, 1903. Filed April 18, 1902. Renewed January 14, 1903.

735.816. Vehicle.—Amos L. Prescott, New York, N. Y. August 11, 1903. Filed December 28, 1901.

735.923. Sparking Device for Gas Engines.—James M. Wilson, Battle Creek, Mich. August 11, 1903. Filed January 29, 1902.

735.930. Engine Governor.—William O. Worth, Chicago, Ill. August 11, 1903. Filed September 18, 1902.

735.954. Internal Combustion Engine.—Fred H. Gile, Greenfield, Mass. August 11, 1903. Filed July 9, 1902.

735.997. Igniting Attachment for Explosive Engines.—James D. McFarland, Jr., San Francisco, Cal. August 11, 1903. Filed December 12, 1901.

736.125. Storage Battery.—Abraham V. Meserole, New York, N. Y. August 11, 1903. Filed May 14, 1903.

736.176. Motor Vehicle.—Herbert Vanderbeek, Hartford, Conn. August 11, 1903. Filed October 27, 1899.

736.224. Gas Engine.—Everett B. Cushman and Leslie S. Cushman, Lincoln, Neb. August 11, 1903. Filed May 6, 1902.

736.239. Device for Smoothing Rubber Tires.—Augustus E. Ellinwood, Akron, Ohio. August 11, 1903. Filed November 10, 1902.

Accidents.

Henry F. Spaulding, of West Orange, N. J., while en route to Chicago lost control of his automobile near Fort Plain, N. Y., on August 11, and plunging into the Erie Canal was drowned.

Mrs. Mary Rose, of Newark, N. J., narrowly escaped death at Trenton recently by the explosion of the gasoline tank, which set on fire the machine in which she was riding with Mr. and Mrs. Oscar Kent.

The automobile of C. D. Ellis, of New York, crashed into a locomotive near Interlaken, Switzerland, on August 12, and it is reported that while the machine was only slightly damaged, the locomotive was so badly injured that Mr. Ellis was compelled to give a bond to secure the damages before he was allowed to proceed on his journey from Paris to Geneva.

In all probability there will be a conference of provincial clubs (attended by representatives of eight clubs from all parts of England and possibly more) held in London in October to discuss and make, with all due deference, suggestions to the A. C. G. B. and I. about the terms of affiliation. Some of the provincial clubs feel that the present terms, by which they receive little else than the club journal for their membership fee, are unfair.

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...EVERY WEDNESDAY...

Devoted to
Motor
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SPECIAL TOURING NUMBER.

For the issue of September 2, midway be-
tween the summer and the fall touring sea-
sons, we announce a special Touring Number,
confined strictly to this popular and most
enjoyable pastime. The recent growth of
automobile touring in the United States
warrants as in promising a treat for all who
are interested in the subject or who are sus-
ceptible to its charms and desirous of joining
the increasing body of American auto tour-
ists. One of the most interesting features of
this number, naturally, will be the depart-
ment set aside for the experiences of tourists
on the road in all parts of the United States
and in foreign countries. In order to make
this department as novel and helpful as pos-
sible the editor invites correspondence from
any of his readers who can contribute suit-
able touring experiences within the specified
time. Instructive data or any amusing in-
cidents relating to touring are also desired.
It is our intention in our Touring Number to
provide solid information as well as enter-
tainment, and to stimulate among the Amer-
ican public the love of nature and the most
convenient and modern mode of enjoying it—
automobile touring.

The Licensed Association Meeting.

The meeting of the Association of Li-
censed Automobile Manufacturers at Ni-
agara Falls last week is generally regarded
as a sign that an issue will soon be raised
between the association and those still
"outside the fold." The association now
counts twenty-seven members, of whom
twenty-five are American automobile man-
ufacturers, one an American gasoline mo-
tor manufacturer, and one an importer of
foreign cars. Of the American automobile
manufacturers still outside the association
about half a dozen have each a great deal
of capital behind them, and one has been
successfully manufacturing cars for several
years and is now among the largest man-
ufacturers in the country.

We understand that strong efforts are
being made to bring this manufacturer into
the association, but it is also rumored that
he has expressed the intention of fighting
the Selden patent "single handed"—that is,
without any outside help. This particular
manufacturer established for himself a rep-
utation as a fighter in a business with which

he was connected before entering the auto-
mobile line, and if it should come to a clash
between him and the association the only
surprise would be that the diplomacy of
the association's management should have
failed in his case when it had been so uni-
formly successful up to that time.

The one motor manufacturer who is a
member of the association finds himself in a
rather peculiar and unsatisfactory posi-
tion—all the car manufacturer members
use their own motors and will not buy his,
and non-members are not allowed to use
them; apparently the only path open to
him is to become an automobile manufac-
turer himself, and for that he is not yet
prepared.

Evidently a decision was arrived at
tending to limit the membership of the
association more closely than was gener-
ally expected. One manufacturer in the
Middle West, we are informed, had
been given to understand that there would
be no question about his admission, all
that was necessary being for him to apply
for membership when the right time ar-
rived. This manufacturer now has the im-
pression that the association does not want
to admit him, but says that he will con-
tinue in business just the same.

The recent move of the association in
placing warning notices in practically all
papers in which automobiles are advertised
is bound to accelerate matters in this re-
spect, as it is very likely to seriously affect
the sales of manufacturers who are not
members, unless they institute some sort
of counter movement. This point has
been called to our attention by inquiries
from a number of readers as to what effect
the organization of the Licensed Associa-
tion would have with respect to users of
unlicensed cars. Being unable to see into
the future, we are, of course, unable to
give a satisfactory answer to this question.

From the fact that another meeting was
fixed for next month it may be presumed
that some of the most important questions

were left open, being found to require more consideration before a final decision is reached.

Fan Dynamometers.

Every engineer knows that for testing small, high speed motors the Prony brake is a very unsatisfactory apparatus. It is almost impossible to keep the resistance of the brake even reasonably constant for any appreciable length of time, and the scale indications can therefore not be taken with any degree of accuracy. Moreover, it is impossible to run the motor under brake test for more than a few minutes at a time. Although the term brake horse power is freely used in catalogues and other trade literature, we do not believe brake tests are commonly applied to motors turned out; at least our visits to some of the factories have never shown the Prony brake in great evidence.

In mechanical laboratories a dynamo and bank of lamps or water resistance have largely replaced the mechanical brake for testing purposes. The dynamo is calibrated—that is, its efficiency at different loads is known—and by measuring its output by electrical instruments and dividing it by the efficiency factor for that output the power developed by the motor is readily found. This method is, however, less suitable for the shop, although a dynamo is very convenient for running a motor under load to “limber it up,” etc., and is used for that purpose by a number of automobile manufacturers.

The fan dynamometer of Colonel Renard, described on another page of this issue, should prove a very useful and convenient testing device for manufacturers of gasoline motors, particularly of high speed motors. The device has to commend it extreme simplicity as well as accuracy obtainable, the possibility of continuous tests and the almost total absence of wear. It may appear strange that the idea has not been applied before. The probable explanation is that the device is only adapted to use at comparatively high speeds, and high speed motors, with the exception of electric, are of comparatively recent date. We understand that Colonel Renard has used this form of dynamometer for over five years, which dates back nearly to the advent of the really high speed motor.

While with an ordinary friction dynamometer the power absorbed varies directly as the speed, with the fan dynamometer it varies as the third power of the speed, and

this explains why the practical use of the device is limited to comparatively high speeds. Halving the angular speed of a given fan reduces the power absorbed by it eight times, and consequently fans to absorb a considerable amount of power at a speed of a few hundred revolutions per minute would need to be of unwieldy size. On the other hand, a fan dynamometer for testing an automobile motor running at upward of 750 revolutions per minute is of very convenient dimensions.

An Alcohol Race in Ireland Proposed.

Remembering probably the change of attitude of the French Government toward racing on the occasion of the “Circuit du Nord” automobile race last year, the editor of an automobile publication issued in Ireland suggests that an alcohol race be held next year over the Gordon Bennett course. The French Government, after having withheld its sanction to nearly all of the smaller road races proposed for the season, not only gave its permission for the alcohol race but took an active part in the organization, being represented on the judges’ committee, offering special awards, etc. The race occurred shortly before the national elections, and it was generally believed that the very favorable attitude toward an alcohol race was an attempt of the Government party to court favor with agricultural voters.

As is well known, alcohol is one of the chief products of the Emerald Isle, and the avowed object of the above mentioned proposition is to promote Ireland’s agricultural interests. The suggestion is at least an indication that some elements in Ireland were favorably impressed with the recent race and desire a renewal of it in another form next year. Prominent among these, we suppose, are the hotel keepers, who in many cases reaped a rich harvest. Whether those who went to Ireland to witness or participate in the race were equally satisfied with their experiences is another question.

To hold such a race as proposed, it would be necessary to secure the sanction of the Local Government Board and the co-operation of some leading automobile organization, such as the A. C. G. B. I., for without the backing of some powerful club it would be impossible to induce any considerable number of manufacturers to go to the expense of shipping cars to Ireland, etc. Now, the question is, Will the plea that an

alcohol contest will favorably affect Ireland’s agricultural prosperity have sufficient weight with the Local Government Board to induce it to grant permission for the event?

Tire Protectors.

Inquiries are constantly received at this office as to where protecting bands for pneumatic tires can be obtained, and the recent mention in our columns of a protector of English manufacture was immediately followed by requests for the address of the American sales agent for this article. All of which goes to show that, in spite of indispensible improvements, the pneumatic tires are still a source of much trouble for many automobilists.

There seems to be a widespread notion among automobilists that some sort of detachable tread or protector may be constructed which will increase the immunity of the tires from puncture and reduce tire expenses in general. As regards immunity from puncture, it seems reasonable that if the tread is protected with a layer of very tough material on the outside there is less chance of nails or other sharp objects penetrating to the inner tube. But whether tire expenses and tire troubles in general can be reduced by a detachable protector is rather doubtful. Such protectors have frequently been tried, but rarely proved satisfactory. Sometimes the durability of the protector is so short lived that the expense for protectors is greater than the expense for tires would be without them, or, again, it is impossible to prevent a chafing action between the tire cover and the protector, which ruins the cover in short order.

Pneumatic tire manufacturers are generally of the opinion that it is impossible to secure a more durable material for tire treads than a combination of fabric and rubber, and that it is only a question of the most advantageous distribution of these two elements. Experience so far seems to bear out this view of the subject. However, so long as tires remain such a vulnerable part of the car, inventors will continue to search for a protector that will add to their life and reliability, and we can only hope that this quest will prove successful.

It has frequently been suggested in Great Britain to abolish the House of Lords, but just now English motorists are more inclined to have the House of Commons abolished.

Renard's Fan Dynamometer.

An ingenious and simple absorption dynamometer constructed on the principle of a rotary fan is described in a recent issue of *L'Industrie Electrique*. The dynamometer was designed by Colonel Renard, and has been used in testing gasoline motors at speeds of from 600 revolutions to 1,500 revolutions per minute, developing up to 80 horse power. The machine consists simply of a horizontal shaft attached to the centre of an ash rod. To the latter are bolted two aluminum plates or disks which act as fan blades when the shaft revolves.

The advantages of a dynamometer of this kind, as compared with a Prony brake, are obvious. The resistance does not change as the test proceeds, and the problem of keeping the device from overheating does not arise.

The most commonly used type of this dynamometer has an ash rod to which the two aluminum disks are secured by two bolts each. To allow of the distance of the disks from the centre line of rotation being varied, each arm of the rod is drilled with eleven bolt holes, equidistant from each other. These eleven holes admit of ten different positions of the disks. Ten intermediate positions are obtainable by means of extra holes in the disks, as shown in the drawing herewith. The apparatus shown weighs complete 26.4 pounds. The distance between holes is 2.2 inches, and the total length 52.8 inches (twenty-four times the distance between holes). Fans of this kind up to 38 inches total length of rod may be fastened directly upon the motor shaft. Larger sizes should be mounted on a separate shaft supported by a ball bearing on a pedestal, the fan shaft being connected to the motor shaft by an intermediate shaft with universal joints.

The resisting torque is always proportional to the square of the angular velocity, and the power absorbed to the cube of the angular velocity. Both the resisting torque and power absorbed are also proportional to the density of the atmosphere, but the variations of this factor are negligible in practical work.

The apparatus may also be used for continuously registering the power developed by a motor, a registering tachometer being required for this purpose, and register charts which have been graduated specially with reference to the particular position of the disks on the rod. All variations in the power of the motor are then shown by the registering pencil and are easily followed and explained. All the power is absorbed by moving masses of air, and power tests may be continued indefinitely, there being no appreciable heating of the air, the dynamometer acting as a centrifugal ventilator.

The device is particularly useful for adjusting a motor. A position for the disks is first found (experimentally) which allows the motor to run at about its normal speed. Then the adjustment of the motor is begun, and every improvement is indicated by an increase in speed.

When it is desired to rapidly test a considerable number of motors of the same size, the size of the fan best suited for the purpose is known beforehand. The motors should all run at a given angular speed, and if any motor fails to come up to this speed it is a sign that it is defective.

It has been proved both by calculation and by experiments that for fans of proportional dimensions throughout, the power coefficient varies as the fifth power of the ratio of linear dimensions. This law has been verified by means of experiments with two instruments the linear dimensions of which bore to each other the ratio 2.2. The fifth power of 2.2 being equal to 51.54, the coefficient of the larger dynamometer should be equal to that of the smaller one multiplied by 51.54. In spite of inevitable experimental errors and inaccuracies of construction, this relation was found to hold very well for all positions of the disks on the rod.

The fans are calibrated in the first place by means of a dynamometer balance. This device consists of an ordinary balance beam mounted on knife edges and carrying two scale pans; a counterweight to regulate the sensibility of the device, and an indicating hand with a movable zero mark on a small frame. The beam supports a base which oscillates with it and carries an electric motor, to which the current is conducted by two wires dipping into mercury cups. A wattmeter is also carried by the base, and is connected so it may be thrown out of circuit. The fans to be calibrated are mounted either upon an extension of the dynamo shaft or upon a parallel shaft, which latter arrangement permits of either a reduction or increase of speed by means of gearing.

To facilitate the calibration it is preferable to use current from a storage battery, and to provide the balance with a dead beam attachment, consisting of a plate fixed to the lower end of the counterweight rod and submerged in water in a tank. It is a comparatively easy matter to thus calibrate a fan, but the law of proportionally dimensioned fans makes calibration of the instruments in most cases unnecessary.

The law of the fifth power, verified on other apparatus, permits of calculating in advance fans of larger power than it is possible to calibrate with the dynamometer balance. If a number of instruments of the same size is required, it is not at all necessary that all should be calibrated, provided their construction is carried out with reasonable care. Colonel Renard possesses a number of dynamometers of the same size, constructed with ordinary care, and experiments have shown that their coefficients vary from each other by less than 1 in 200. With all metal construction far better results might even be obtained.

The same fan may be used to test motors of widely varying power, owing to the fact that the coefficient varies greatly as the aluminum disks are moved from their innermost to the outermost position on the rod. For the type which has been recog-

nized as the most generally useful the principal dimensions are expressed as a function of the modulus a (distance between adjacent holes):

Distance between holes, a .

Length of rod, $24a$.

Thickness of rod, a .

Width of rod, $2a$.

Side of the square disks, $60-11a$.

Thickness of disks, $4-55a$.

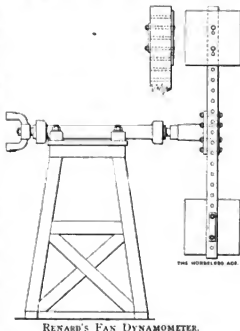
Diameter of bolts, $10-55a$.

Diameter of shaft, $40-55a$.

Number of holes on each arm of rod, 11.

Distance from the centre to the last hole, $11a$.

The limits of power which a dynamometer of this kind may absorb are determined (1) by the limits of speed which the rod will sustain; (2) by the limits of fibre stress in the rod. The first condition demands a limit of circumferential speed of 100 metres (328 feet) per second. This



limit has been reached in experiments, but it is possible that the law of the square of the speed still holds good at higher velocities. The fibre tension in the rod, on the other hand, has been limited to 100 kilogrammes per square centimetre (1,420 pounds per square inch), which, with selected ash wood, still leaves a factor of safety of 7 to 8. By combining these two conditions the limits of use of a given dynamometer are easily determined, both as regards angular speed and power.

It is easily demonstrated that all fans of proportional dimensions have the same factor of safety when turning at the same peripheral speed. This equality of safety factors applies not only to the rod, but also to the disks, the bolts and the shaft.

It may surprise that a fan of such restricted dimensions is capable of absorbing so much power. A simple calculation will prove, however, that the result is perfectly in accord with physical laws and generally known experimental observations. At a ve-

locity of 150 feet per second the pressure or resistance of the air is about 50 pounds per square foot; at 300 feet per second it would be four times as great, or 200 pounds per square foot. The disks of a fan 24 inches in diameter would be about 5.5x5.5 inches and have a combined surface, together with the rod, of about one-half square foot, so that the pressure on them would be about 100 pounds. The power absorbed at a peripheral speed of 300 feet per second (3,000 revolutions per minute) would be $300 \times 100 \times 60 = 1,800,000$ foot pounds per minute, or about 55 horse power.

It is stated that fans of the proportions in the table above "have values k which vary from .0690' to 1.0180", the first of these values corresponding to the rod alone and the other to the disks in the outermost positions. If we understand this correctly, it means that the power absorbed by the fan when running at a peripheral velocity of 100 metres per second, with the disks in the outermost positions, is $P = 1.0180a$, a being in centimetres and P in kilogram metres per second. This would give for the limit of power for the instrument above referred to, in which $a = 5.5$ centimetres, 5.123 kilogram metres per second, or 67.5 horse power.

A fan of "modulus" 2 inches should



SKETCH OF DR. POWER'S CONDENSER.

prove very useful for automobile manufacturers. At 1,455 revolutions per minute such a fan, with the disk in the outermost position, would absorb 42.62 horse power. The power for other speeds can readily be found by a simple proportion, as the powers at different speeds bear to each other the same relation as the cubes of these speeds. Thus at 750 revolutions per minute this brake would absorb $(750^3 \div 1455^3) \times 42.62 = 5.85$ horse power.

Secondary Condensers in Ignition Outfits.

By DR. HENRY POWER.

In a recent issue of THE HORSELESS AGE I noted that this subject is now attracting attention, and some experiments I made four years ago may, therefore, be of interest.

A condenser for this purpose may be of many different forms, and the oldest used is the Leyden jar, which is familiar to users of machines for the production of frictional electricity.

As the Leyden jar is easily broken and takes up much room, it was necessary to design some form which would be free from these defects. I made two forms both of which are now on my desk. A brief description of one form follows. Four sheets of hard rubber were obtained, two of which were one-eighth inch thick by 4 inches wide, by 8 inches long. The

remaining two were one-third-second inch thick by 4 inches wide, by 8 inches long. Three sheets of tinfoil were used, each 3 inches by 6 inches. All these parts were now given a coat of thick shellac, which had been dissolved with the aid of pure grain alcohol only (wood alcohol will not do).

This was allowed to grow stiff, and the parts were then laid together in the same way as a primary condenser is constructed, or according to the following diagram. Here A are the thick rubber plates, B is the thin rubber, + + represents the foil which extends far to the right, while — is the foil which extends to the left. It requires some care to place the foil in the correct position, as the shellac makes it both heavy and very sticky.

Holes were now drilled at C and C', into which brass machine screws were passed. These screws were long enough to have a nut and lock nut placed upon them, and one-quarter inch longer. It will be noted that the screw at C passes through the tinfoil marked —, and the screw at C' through the two layers marked +. These screws are to act as the terminals in the finished condenser, and for the present serve to keep all parts in place.

The nuts and locknuts being in position,

we now proceed to force out the alcohol yet contained in the shellac. We do this by means of heat great enough to boil water, and at the same time not too high for the delicate rubber. A temperature of about 300-350° Fahrenheit is sufficient, and may be continued for several hours. We find on cooling the now finished condenser that the shellac has bound all the parts into a mass which will resist violence up to the limit of the structure of the rubber; at the same time it has insulated the various sheets of foil one from the other. The temperature must be high enough to drive out the water in the shellac, as otherwise the resistance of the gum is much reduced.

In the series of tests made with this condenser a laboratory coil made by Williams & Co., of New York, was used. This coil, which had a magnetic vibrator of standard form, gave a spark 1½ inches in length. When the condenser was used the following changes in the spark were noticed: The spark would not jump more than 5-16 of an inch, and was much thicker and more brilliant; at the same time a loud report was produced, which could be heard some distance away. The color of the spark was blue.

Experiments were now made to determine the heating effect, and a few drops of gasoline were found to be ignited as well with as without the condenser.

Experiments were then made with less

inflammable material, such as tissue paper, and it was found that when the terminals were one-eighth of an inch apart the condenser reduced the rapidity with which a flame was produced, and not infrequently made ignition impossible.

The condenser was now attached to the secondary terminals of another coil and used in practical work to ignite the charge in an automobile engine. It seemed to have very little effect, and, if anything, seemed to hinder the regularity of the explosions.

In all these experiments storage batteries were used and ample current supplied to the coils.

If any reader wishes further information as to these experiments, or as to the construction of the condensers, I shall be glad to give them.

Italian Electric Mail Wagon.

An electric mail wagon has been in use for some time in the city of Milan, Italy, and was recently subjected to trial tests in the presence of officials of the Postal Department. The wagon is used for collecting the mail from boxes and the stamping and sorting are done en route to the post office, which results in a considerable saving in time. The wagon was built by a Turin company and has a box body of very liberal dimensions, and a seat in front for the driver. The body accommodates two occupants, a postman to collect the mail from the boxes and a clerk to stamp and sort the letters on the trips between boxes. There is a clerk in each district of the city who receives the mail from the wagon at specified places and distributes it at once along his mail route, and thus the letters are at once distributed without passing through the post office, hence a great saving of time. The wagon is of standard gauge so that it can travel along the street car tracks. The two motors of 6 horse power, one for each axle, drive it at the rate of 4 to 12 miles an hour. Suitable controllers and brakes are provided. It is now proposed to extend the system and carry out all the postal distribution in the city of Milan upon this plan.

Calendar of Automobile Dates and Events.

August 30—International Races of the Frankfurt Automobile Club, Frankfurt-on-the-Main, Germany.

September 4-5—Cleveland Races.

September 6-13—Vienna Automobile Week.

September 7-8—Detroit Races.

September 11—Syracuse Races.

September 18-24—English Reliability Trials.

September 19—Narragansett Park Races.

September 19 or 20—Empire City Track Races, Yonkers.

September 23—Meeting of the Association of Licensed Automobile Manufacturers.

October 2—Brighton Beach Races.

October 5—Paris Cab and Delivery Wagon Trials.

October 7-14—New York-Pittsburg Endurance Contest.

TOURING IN

AMERICA.

IX—Eastern Adirondack Region.

By C. H. GILLETTE.

The word Adirondack is an Indian one, meaning "bark eater." It was originally an anathema applied in derision to the Indians of the northern slope of the Adirondacks by their more southern brethren. The term, from habitual use as applied to the Indians, finally became the name of these mountains. The Adirondack region in its broad sense includes the northeastern corner of New York State, and may be said to reach into Vermont. The line of demarkation between the eastern foot-

cr, was the discoverer of this lake and gave it its name. This explorer was also the first white man to set eyes upon the Adirondacks—in 1609, at the time of his discovery of the lake, in company with a band of Indians who were on a war expedition against their adjoining southern enemies. The party of De Champlain encountered the Iroquois tribe at the lake, and there ensued a battle which was one of the first in which the arrow was pitted against the firearm in this country.

All touring routes in the Adirondack region east of the Hudson River lead from Troy or through it. The city itself consists of an upper and lower town. While the winding roads from the river portion of the city to the heights above are well paved, they are still problems for the automobile. The best way to get out of Troy is by way of Lansingburg, which

on the plateau which lies at its feet, and looking beyond these the tourist may see the entire north valley of the Hudson. On clear days the Adirondack peaks can be distinguished, while to the eastward the great hills of Vermont rise tier after tier as far as the eyes can do duty.

The road is a cul-de-sac. To continue is impossible, for the highway runs down the mountain side over impassable grades. The trip can only be undertaken with the purpose of running to Grafton and back to Troy. The whole trip is but one afternoon's recreation.

The main road to the north bears well over toward the Vermont line. The course is through Lansingburg, Schaghticoke and Johnsonville to Eagle Bridge. From there a route runs to Bennington and beyond.

Turning north at Eagle Bridge, the



(Courtesy of New York Central Railroad.)

KEENE VALLEY, LOOKING BACKWARD.

hills of the Adirondacks and those of the Green Mountains is an unknown mark.

As an automobile touring country the chief features of the Adirondack Mountain territory proper are purely scenic. Great care must be exercised in laying out a tour among these mountains, and the irregular directions of the roads make it very necessary for the automobilist to be careful not to get lost in the labyrinthian ways. Certain of these routes are very good, taking into consideration the mountainous nature of the country.

The Adirondack region, from the tourist's point of view, naturally divides into two sections—the western or mountainous region and the eastern or lake region, which takes in Lakes George and Champlain. Not only do they differ scenically, but the lake section has in addition a decided historic interest which is much stronger than is the case in the mountains. Lake Champlain has an early history. Samuel de Champlain, the French explor-

has paved streets, continuing the Troy streets to a point 7 or 8 miles to the northward.

There is one route much affected by automobilists, which leads southeast from Troy. It runs to Pittsfield, Mass., by way of Sand Lake and Stephentown, and is a thoroughly good road in all respects, though not particularly level.

A short run of not more than 10 miles is east from Troy to the top of Grafton Mountain. It is a good macadam turnpike for the entire distance and passes through Cropseyville and Quackenkill. Recently this road has been in poor condition because of public works under construction. It is, however, passable. It is a steady up grade all the way to Grafton, but the visitor will be well repaid for his trip. He should keep on through the post office town of Grafton, and, passing over the top of the mountain to the northern slope, will gain a view of surpassing beauty. Four large ponds are to be found

route lies through Cambridge and turns there to the west, passing through Greenwich and into the main road, which at this point runs north toward Whitehall.

A pleasant variation of the trip from Cambridge is to follow more closely the line of the Delaware and Hudson Railroad past a chain of lakes (Lauderdale, Schoolhouse, Dead Lake and Hedges Lake) in a charming valley. The road winds from side to side of the valley, passing between these lakes at certain points. The scenery is a delight to the eye. By way of East Greenwich one may reach Lake Cossayuna, a famous fishing spot for the people who live in this part of the State. A continuation of this road is into Fort Edward, where the main road to the north (here the "River road") should be taken to reach Glens Falls, the real gateway to the Adirondacks with regard to touring.

From Glens Falls there are two routes which lead straight to Montreal, Canada. One of them—the western—follows closely



THE ARCH IN GLENS FALLS.

along the west shores of Lakes George and Champlain, while the other runs along some distance inland to the east of these lakes.

The western route, scenically the better of the two, goes along the Plank road from Glens Falls, passing French Mountain and Glen Lake to Caldwell at the southern extremity of Lake George. Here the plank road is left and another road equally good, though a dirt road, skirts the shore of Lake George northward to Bolton Landing. The worst stretch of road along this whole route of more than 150 miles is from Bolton Landing to Baldwin, a distance of about 25 miles. It is a sand and gravel road and very hilly, but is passable. It is worth the try for the sake of the magnificent mountain scenery. Tongue Mountain, just northward, juts out into Lake George and slopes northwesterly into Catamount Mountain, farther northward. To the left the country takes long jumps in a series of giant steps to the sky touching main range of the Adirondacks, behind which lie Schroon Lake and Paradox Lake. To the northward of these lakes is beautiful

Keene Valley, by some Adirondack tourists described as very nearly the equal of some of the more famous Western cañons.

There is a way of avoiding this poor road—by steamer to the upper end of Lake George. The scenery is still to be enjoyed, but not from the seat of the tonneau. There is not the same keen enjoyment to be had leaning over a boat rail—not the same exhilaration. Anyway, one takes out a car to ride in it, not to give it a trip on a steamer.

This difficult ride left in the rear, you can commence to enjoy fairly easy riding following the shore generally to Ticonderoga. The first idea that comes to the tourist on entering this city is the old historical port.

Fort Ticonderoga is but a short distance from the city of that name. It is situated on a promontory between Lake Champlain and the outlet of Lake George. This particular spot used to have another name than it has today. In 1750 the French called it Carillon, which Englished means "chime of bells." The word Ticonderoga is a corruption of the Indian word for "brawling water," *Tenunderoga*. Curiously enough, both the Indians and the French chose names for this place from the impression which the sound of the rapids there made upon them. In 1755 Montcalm built Fort Carillon—a completion of the first works erected in 1683 by Dieskau. In 1758, during the French and Indian War, Montcalm was attacked by the British commanders Abercrombie and Lord Howe. He defeated the British, who retired with great loss. But in 1759, when 11,000 men and 50 brass cannon were turned against him, he evacuated and destroyed everything which he and his predecessor had built in this wilderness. In May, 1755—but who does not know the story of the Green Mountain Boys and Ethan Allen, who captured the British garrison? Patriotism was rife in this part of the colonies. Instance a letter written

by John Brown, of Pittsfield, Mass., to Samuel Adams and Joseph Warren, of Boston, which said:

"Should hostility be committed by the King's troops, the people of the New Hampshire grants would seize the fort at Ticonderoga."

It was on Sunday, of May 5, 1775, that Ethan Allen, with 150 Green Mountain Boys and some Massachusetts soldiers, marched from Castleton to Orwell on the western bank of the lake and just opposite the fort. On the 9th eighty-three men were ferried over the lake and landed near Fort Ticonderoga. It was night time and, without waiting longer for more men, Allen and his brave little crew advanced to the gate of the fort, not heeding the sentries' challenges nor the fact that shots were fired. They rushed into the fort like a band of wild Indians and formed into a hollow square about the barracks. The British commander came out to learn the cause of the trouble, *en deshabille*. He was immediately called upon by Allen: "Deliver me the fort instantly." "By what authority?" demanded the British officer. Then came the memorable: "In the name of the Great Jehovah and the Continental Congress!" The Americans immediately took possession of this stronghold with its great stores of armaments.

In March, 1777, the command of Fort Ticonderoga fell to the lot of St. Clair, who had under him 3,300 men, poorly equipped and only half what was really needed. Mt. Defiance, just south of the fort, was not fortified. St. Clair made the mistake of not doing so and occupying this mountain, because it was in a position to command Fort Ticonderoga. General Burgoyne, the British commander, took possession of Mt. Defiance and on the morning of July 4, the first anniversary of the Declaration of Independence, Burgoyne's batteries opened upon Ticonderoga, and St. Clair and his army had to evacuate.

From Ticonderoga the road, though



(Courtesy of New York Central Railroad.)

KEENE VALLEY, LOOKING FORWARD.

somewhat hilly, is good hard gravel. Historical old Crown Point is met with and enjoyed. The ruins are about 3 or 6 miles to the northward. Soon you come upon Fort Henry, passing Bulwacca Bay, the scene of Champlain's battle with the Iroquois Indians. Passing through Westport you come suddenly upon Split Rock, a better view of which can be had from the northward. Passing successively the towns of Essex, Willsboro and Keeseville by way of Ausable street, one may have the benefit of a good level road to the world famous Ausable Chasm, with the wonderful Jacob's Well. A trip through the chasm will make one think that Dante must have been here before he wrote the "Inferno." A trip from Rainbow Falls to the Basin will leave one with a feeling of supreme wonder. Farther along, not far from Plattsburg, is Hotel Champlain. Just off the shore at this point is Valcour Island, where, in October, 1776, the first naval battle of the Revolution occurred.

Captain Pringle commanded the British force and Benedict Arnold, who afterward turned traitor to the American cause, commanded the Continentals. Though defeated, Arnold won the admiration of even his enemies. At the south end of the island lies the wreck of the ship *Royal Savage*.

Plattsburg is a short distance north of Valcour Island. The city is on the west shore of Cumberland Bay. Count Charles de Fredenburg, a captain in the British army, was the first settler in this region, under warrant of the crown, on June 11, 1759. Of course, after the Revolution the title to this estate reverted to the State of New York, and was subsequently, in 1784, granted to Z. Platt and others, who, as progressive men, advanced the interest of the little village and their properties. In 1785 the town of Plattsburg was incorporated. It took its name after the grantee. It had at that time a population of perhaps not more than 200.

In 1814 Cumberland Bay, upon which Plattsburg is situated, was the scene of the historical battle of Plattsburg, on September 11, Sunday morning. General McComb with the American land forces, and Commodore Macdonough, commanding the Continental marines, were attacked by the British land and water forces under General Sir George Prevost and Commodore Downie. Victory for the Americans was the result. Not only were the British defeated, but their strength in that part of the country was annihilated. Immense quantities of stores and ammunition were captured from them, and practically all their boats either capitulated or were destroyed. At the present time Plattsburg is a United States army post.

The road continues good through Plattsburg and Chazy to Rouse's Point, at the upper end of Lake Champlain, with no abatement of variety in the scenery. The mountains have, however, receded farther to the westward. Near at hand are only foothills and you are now out of the Adirondacks proper. There is no lack of places of historic and scenic interest about Rouse's Point. A great many excellent side trips could be made which would amply repay the tourist for making a stop or two at this enterprising frontier city.

A pretty good road northward runs out of Canada street to Montreal. From there on you will notice that nearly all the town names are prefixed by "Saint," a "Canuck" habit in the Province of Quebec. St. Valentine is the first important city encountered; then St. Johns; and then St. Lambert on the opposite shore of the St. Lawrence River to Montreal. Crossing the Queen's Jubilee Bridge at St. Lambert, you are in Montreal.

To retrace a little of the road, Rouse's Point is the city where the route from Glens Falls which runs along the eastern shore of Lakes George and Champlain crosses the latter lake and meets the route



"COOPER'S" CAVE, WHICH FIGURES IN "THE LAST OF THE MOHICANS."

just described. From Glens Falls this eastern route runs through an entirely different kind of scenic country to the other. It goes through Fort Ann, Whitehall, on South Bay, at the extreme southern end of Lake Champlain, Fair Haven, and Castleton to Rutland. Ahead of you loom the Green Mountains.

From Rutland the road dodges through the foothills of the Green Mountains, through Pittsford and Brandon and past Lake Dunmore at Salisbury. From there the road gradually approaches Lake Champlain through Middlebury and Vergennes. About 8 miles farther, you commence to skirt the shore. On the western shore of the lake towers Split Rock Point, surmounted by the lighthouse. Not much more than an hour's run takes you into Burlington.

From Burlington there are two routes to Rouse's Point. One is by way of West Milton to the shore, and, crossing Sand Bar Bridge, northward along Grand Isle to the town of Alburgh. The road is generally good, though sandy in some places.



A VIEW OF CRANDALL PARK NEAR GLENS FALLS.



BLOODY POND, WITH FRENCH MOUNTAIN IN BACKGROUND ON THE ROAD TO LAKE GEORGE.

Here water is on both sides of you, Grand Isle being a large island in Lake Champlain. The other route is by way of Milton, St. Albans and Swanton. From Swanton you follow the Missisquoi River road to Hog Island, from the west shore of which you cross Missisquoi Bay by bridge to Alburgh on Grand Isle. Opposite Windmill Point is Rouse's Point, N. Y.

From Alburgh, however, the best way to get to New York State is to go south on Grand Isle to Reynold Point, crossing Isle La Motte and then proceeding to Chazy Landing, in New York. Rouse's Point is but a few miles to the northward on the route along the west shore of Lake Champlain.

The route along the eastern shore of Lakes George and Champlain from Glens Falls is better suited to touring than the western route, the grades being easier. While the scenery is all that one could desire, it is not by any means equal to that nearer the Adirondacks.

There are a number of excellent side trips that may be taken from Burlington, Vt., which runs into the heart of the Green Mountains. One route runs through Essex Junction, Jonesville, Bolton, Waterbury, Montpelier, Plainfield, West Danville, to St. Johnsbury and follows the Winooski River practically all the way. There are no very bad hills, although there are no level stretches. For the most part the roads are rolling to hilly and of good riding quality.

After leaving Essex Junction the first of the foothills of the Green Mountains are sighted—Bald Hill, Chamberlain Hill, Huckleberry Hill. Then a little beyond Jonesville they are dignified to the size of mountains. North Mountain and Robbins Mountain are on the south, and Stinson's Mountain and Bone Mountain just north, the road running along the river valley between. A little farther south are Bald Mountain and Camel's Hump, with its observatory. To reach Camel's Hump, if a nearer view of its curious form and beauties is desired, take the road—a passable one—running south from North Duxbury Station. It is about an hour's run there and back.

Just across the river from Waterbury and east of Duxbury is a marble quarry. This part of the country has a great many of them. The Green Mountains seem to have an almost unlimited supply of marble, judging from the number of quarries. A few miles beyond is Montpelier, from which a number of short runs, both northward and southward, into mountain and lake country may be made. Beyond Montpelier and Plainfield is a new line of foothills and mountains. There are Lord's Hill, Bald Mountain, Nigger Head Mountain, Owl's Head Hill, Devil Hill and many others to the east, and Long Meadow Hill, Hersey Hill, Knoll Hill, Eagle ledge and so on almost ad infinitum to the north and west. All the way to Johnsbury the same kind of scenic country is encountered, and

an endless variety of mountain shapes and falls, and streams, and pretty nooks serve to give the eye each minute a new delight.

Another of these beautiful side routes from Burlington branches to the right from the former route at Essex Junction through Jericho, Cambridge, Johnson, to Hyde Park. This one affords the tourist practically the same kind of scenic attractions. It runs just north of the highest peaks of the Green Mountains.

This route may be extended and made a circular one by continuing from Hyde Park through Morristown, Stowe Center, Moscow to Waterbury. At Waterbury turn right into the river road (Winooski River) and go in the opposite direction to the side route from Burlington first described.

There are other routes, one of which, to Lake Memphremagog, is a beautiful one. It runs from Hyde Park through North Walcott, Branch, Albany, Coventry, to Newport, at the southern end of the lake.

Economizing Gasoline.

The distance which one driver can accomplish upon a given quantity of gasoline is often a subject of much astonishment by the driver of another and similar car, as he finds it almost impossible to get the same results out of his own vehicle, although it is, as we have remarked, identical with the one consuming the lower quantity. The whole question lies in the fact that the one who is able to use a lower quantity of fuel has hit upon the correct method of running his engine—and that is allowing the carburetor to take in as much air as it possibly can, and still to retain a good mixture. The most effective mixture of hydrocarbon vapor and air is that which will run the engine at its highest power, which power is in no way increased by increasing the richness of the mixture. What is really meant by this can easily be ascertained by the owner of any motor in the following manner: Close down the air opening to the carburetor so as to obtain a rich mixture for starting, and then turn the starting handle, when the motor commences to work. Attention should now be turned to the air inlet. Open this slowly, and if a governor is fitted this should previously have been put out of action by the accelerator being pulled up or tied down, as the case may be. As the mixture assumes its better proportion, the engine will perceptibly quicken its speed, and with its speed the power, of course, increases. Continue opening the air inlet until it is wide open, and if there is no marked diminution in the speed of the engine it may be assumed that it is running on the best proportion of mixture obtainable. If, on the other hand, the engine begins to slow down, the air inlet should be closed down again until the engine picks up its previous speed and gives out that note which spells power. The engine is now running to its best advantage, and is consuming the smallest amount of gasoline possible.—*The Autocar.*

LESSONS OF THE ROAD

A Trip to Readville.

By CHARLES S. DENNIS.

We went to Readville on Bunker Hill Day. "We" includes myself and three friends and a powerful road carriage. My friends and I are veterans, comparatively speaking, and we felt that we could enjoy the day to the utmost. But we didn't expect to be landed on our backs while wearing our good clothes, nor did we expect to act as reformers and almost compel a toper to take the pledge forever. We did learn something, however, as we expected, for there is nothing like an automobile to bring out the character of a man, and no better way of studying human nature than from the seat of a carriage.

OUR TEMPERANCE REFORM MOVEMENT.

We were skimming smoothly along the highway just outside of Boston, our carriage being under perfect control, with an electric car and another automobile just ahead of us. Suddenly a drunken man stepped off the car almost in front of the first automobile, which missed him by a hair. Now that fool drunk, instead of hurrying for the sidewalk, stood in the middle of the street, shaking his fist at the retreating car, and "daring the blame old gasoline tank to come back." Well, our gasoline tank would have gone over his back had we not braked our carriage hard. We smashed our chain, but gave the drunk such a scare that it almost sobered him. He scrambled off, while we, in our glad clothes, crawled under the car and fixed up the chain. But the narrow escape from being struck by the cars gave the drunk such a fright that I think he'll keep sober all summer. I hope so, anyway.

GOGGLES NO TRUE SIGN.

We got to the races all right, and enjoyed them. But we were also amused by the carriages and their owners about the track. From what I observed I've come to the conclusion that it takes something more than goggles, gauntlets and leather jackets to make an automobilist, and that something is experience. Here are a few practical reasons for my conclusion:

THE SMOKY CARRIAGE.

One carriage—of course it was fine looking, for it was just like ours—stopped in a neighborly way near us. But a cloud of smoke enveloped it at times, as a fog envelops a steamer. The cylinders sent out clouds of smoke like a little fishman smoking a big T. D. The \$100 chauffeur didn't seem to know what the matter was, or perhaps he didn't care, and the owner evidently thought all carriages were confirmed smokers. However, we made bold to suggest that he had too

much oil in his cylinders and was burning it. Being a reasonable man, he saw the point, and thus the smoking habit was cured.

NEITHER WISDOM NOR SPARKS.

Our next acquaintance was not so gracious. He, too, had a carriage like ours. He was getting ready to go home, and his chauffeur had been turning the crank for about twenty minutes, like a hand organ man grinding out a quickstep. We made bold again to ask the chauffeur if he had turned on his spark. As you probably know, it is about as bad to tell a man how to run his carriage as to advise a baldheaded man on the best way to prevent mosquito bites. The chauffeur explained that he knew the A B C of automobilism, but a moment later I saw him put on the spark.

Of course, then he had too much gasoline in his engine to start it. I took the courage to mention this to the all-wise chauffeur, for it made me tired seeing him grind the crank so long and fussing about so foolishly. But his highness kindly told me that "in his carriage there couldn't be too much gas."

Well, I guess he knows now that there can be such a thing as too much gas. He had to shut off his gas and turn his crank again, but he failed to get a spark. This poor fellow had about as much trouble in getting started on the trip back to Boston as did Columbus in getting ready to discover America; but, like Columbus, he at last got started.

BRAINS VERSUS PRAYER.

"Here's praying that we get back to Boston all right," said the owner of the carriage as he left. He didn't need prayers for his trip. He needed brains. He had one of the best carriages on the market, but he ought to send his chauffeur back to the hay mow shed, or to school. That \$100 a month ornament took our advice, began getting his carriage ready all over again, and finally started on the homeward trip.

But what a lot of pleasure the owner of that carriage misses in not knowing all about it. He ought to be his own chauffeur for a while. The secrets of the interior of an automobile are as beautiful to the true automobilist as are the secrets of the interior of a beautiful flower to the naturalist or the interior of the human system to the surgeon. A man who knows his machine, inside and out, is a master of it, and enjoys it because he is its master, just as a horseman loves to rule a spirited horse. The man who knows nothing about his carriage and depends entirely upon his chauffeur, even for the tightening of a nut, might just as well be a passenger on a Pullman car as far as his sport and pleasure are concerned. That is my opinion of it.

A SCHOOL FOR CHAUFFEURS.

Speaking of sending the chauffeurs to school, I must take a moment to remark that I think the idea a good one, even if it is one of my own. You know, a successful automobilist is said to be a machinist, an

electrician and an engineer. Building automobiles is a new trade, and driving them is a new occupation. So I believe that chauffeurs should be trained or coached in some school, just as locomotive engineers are coached and trained before being given a "regular," and just as horseback riders are taught.

We got home again with never a worry or a care, save for our unlucky acquaintances. The experience of our trip firmly convinced me, as I've stated above, that it takes something more than goggles, gauntlets and gloves and leather jackets to make automobilists. It takes experience. And if we watch, we learn something new every day.

A COMEDY OF BLUNDERS.

Some men ought to learn running an automobile on the broad prairies, as the following story shows:

A friend bought a new carriage and had learned to handle it. A man who had had a carriage a month, but didn't know much more about steering it than a Patagonian, ran into my friend's. This is the way he says it happened:

He was riding slowly along, when, all of a sudden, and like a tiger bounding on his prey, the carriage shot out of a wood road and banged into his carriage, carrying away his fenders.

This was a comparatively slight accident, but that farmer automobilist kept on up the road after the accident, and then turned back to see what damage he had done, and, "blow up my carriage," if that fellow didn't bang into the other side of my friend's automobile and tip it over. The hood was smashed in, the axle sprung and considerable damage was done to the machinery and top. So injury was done, but, worse than all, insults were added. The cheerful "man" looked at my friend toiling among the ruins, and calmly asked him "if he was getting along all right now." A moment later the cheerful "man" discovered that he had punctured his own tire in ramming my friend's carriage, and then he condescended to ask my friend of the wreck "if he had an extra tire to loan him."

AN AUTO CARRIED HIS SOLE AWAY.

An unusual accident happened in Beverly lately. A youngster raced across the street before a swiftly approaching carriage. The front wheel just touched his foot and took the sole off his shoe about as neatly as if it had been done with a knife. The boy limped to the sidewalk, and the chauffeur quickly came back and made good the damage done. The boy was not hurt.

AN AUTOMOBILE TRAP.

The police around here have a clever contrivance for catching automobilists who travel faster than the law allows, which they call an automobile trap. A Yankee constable in the town of M— invented it. He had arrested three or four automobilists for fast driving, and those fellows had gone onto the witness

stand in court and meekly testified that the constable must have made a mistake, for their carriages could not travel faster than 8 miles an hour, because something was broken, or the gasoline was bad, or any old excuse. The constable, never having been in a horseless carriage since he was an infant, was not classed as an expert on automobile speed, and the court always gave the defendants the benefit of the doubt and discharged them.

Now this constable, being a Yankee, set his brain factory going to think up a scheme for getting even. As a result he bought a tape measure, a flag and a stop watch. He measured out a half mile stretch about as smooth and as velvety as the road to heaven, and sat down at the beginning of it and got a companion to hang around the other end to hold the stop watch.

Patience is always rewarded, and a carriage at last came in sight of the watch-jug constable. The chauffeur saw the handsome stretch of road (which, by the way, runs into the town) and pulled wide open his speed lever. The carriage shot across the mark like an arrow; down dropped the constable's flag, and tick, tick, went the stop watch on the other end.

Then the constable hustled to a telephone to have the parties arrested upon their arrival in town. Of course the automobilists protested at the outrage of arrest by the town officers, declaring that they had been riding slowly, but they had to give in when the Yankee constable arrived with the "correct time." They paid their fine in court, too, and now every town and hamlet hereabouts has its measured course, and a constable with a stop watch is likely to be behind any tree or stone wall, for it is safer to catch automobilists than it is to catch burglars, and in a small town the police have to do something for their money.

Diary Notes of a User.

By ***

Receiving a telephone one evening from a friend that he had lost his pump chain and was stalled in a town about 30 miles distant, and realizing that the train would reach there only at a rather late hour the next day, I acted upon the principle that one automobilist should help another, and started early the next morning with a mechanic and a new chain for the scene of the trouble, which was reached very promptly and pleasantly. We found that his

PUMP SHAFT HAD STUCK

fast in its bearings, owing to lack of lubrication. The strain had been too much for the small bicycle chain, which had broken, and in so doing had been caught in the secondary gears and had badly sprung the cam shaft. Strangely enough, no grease cup or other means of lubrication had been supplied to the pump shaft, and one can hardly wonder that it had "set." There was hardly more than 6 inches between the centres

of the pump sprockets, and so short a chain seldom runs very well. It is hard to say why the manufacturer had not used spur gears for driving the pump, as they could easily have been arranged. Pump chains are constantly requiring adjustment to take up the looseness due to wear, and if this adjustment is not made when needed, the chain is almost certain to ride the sprockets and jump off or break; possibly bending the shaft in so doing. On my car no method for adjusting the pump chain had been provided, and when it became dangerously loose I was forced to take the pump bracket off and file its round bolt holes into elongated slots in order to give it a motion of adjustment.

GROUND JOINTS SUPERIOR.

My friend had reached his destination after the loss of his pump connection by running his engine until it became so hot as to pre-ignite too badly, and then shutting it down and waiting for things to cool off, when he would repeat the process. In this way he reached the town by stages. His engine is provided with a ground joint between its cylinder head and cylinder, and since learning of his experience I have been more than ever an advocate of this method of connection. If he had had any kind of an asbestos gasket to pack this joint we should have had a job of repacking on the docket. A ground joint gives entire freedom from gasket troubles and still renders it easy to take out the reciprocating parts when desired and makes a less difficult construction for the molder and founder than does the casting of the head and cylinder integral.

CAUGHT IN A RAINSTORM.

At last we succeeded in getting my friend's car into running condition, but it had begun to rain very hard, and, as the last (and only) train had departed, there was nothing to do but to plod home in the rain. We started in a moderate down-pour, which became torrential when we had gotten well out on the road. Neither car had any top or hood, and we were soon thoroughly soaked. There is a strong temptation, when caught in the rain, to run fast toward shelter, but I soon found, to my sorrow, that one should not yield to it. On a particularly slippery piece of road my machine began to skid unmanageably, and in an instant it had plunged head first into the roadside bushes.

My passenger, who is a skillful and veteran automobilist, needed no instructions, but immediately ran to the nearest house for assistance, as soon as it was seen that the reverse had no power to extricate us. An obliging resident was soon on hand, and, by dint of the application of plenty of "beef" to the spokes of the rear wheels and the simultaneous application of the reverse, we finally got back to the road. The only damage apparent was the bending of a few of the radiating flanges which had struck the trunk of a small tree. Our good friend would accept no reward other than our fervent thanks.

My engine is horizontal and hung very low, and sometimes, when we splashed through a particularly bad mud puddle, the

SPARK PLUGS WOULD SHORT CIRCUIT

and cut out a cylinder for an instant. This was not reassuring, but we kept going and reached the city, drenched, but thankful.

Exposed clutches suffer sadly from the abrasion of the mud thrown upon them during wet runs, and I found that my clutch had worn more in this trip than during a long previous use. It was necessary to wash it out carefully with gasoline in order to clean the bearing surfaces of grit.

WEAR IN DISTANCE ROD JOINTS.

The distance rods of my car are simply iron forgings, and their bearings on the rear axle and the body, being of soft metal, have worn so that there is a large amount of play, which occasions an undue amount of rattle. The wear of the distance rod on the side which receives the driving chain pull is specially pronounced. The studs which form the bearings of these radius rods should, I believe, be of hardened steel, and the holes in the rods which receive these studs should contain hardened steel bushings, with suitable oil holes. I shall be forced to make this improvement before long.

One fine Sunday morning I started with a passenger for a country town 31 miles distant, which is situated in the midst of the hill district and entirely untouched by the good roads movement. Toward the end of the run we made a wrong turn and found ourselves on a lumber road where the ruts were so deep that it seemed as if the engine must scrape the ground. We pulled through all right, nevertheless, and came out on the traveled road at a point where the view was fine enough to pay for all our low gear work. Our destination was reached with no trouble of any sort, except that the relief cock lever had evidently become loosened by the jar and kept opening the relief valves every mile or so. As the cocks could not be operated from the seat, I fastened them closed with a piece of iron wire, a supply of which I always carry.

A TIRE GIVES WAY.

We started for home in good time and tried another road, which proved to be worse. When within a mile of the stable there was a terrific report, and my passenger stoutly asserted that we had been fired upon from the woods. Having "been there many times before," I knew better and realized that the rocky roads had claimed tribute in the shape of a tire.

My companion stoutly averred that there was a flash which accompanied the report, and it seemed so to me, and has several times previously when I have been similarly unfortunate. It would be interesting to know whether this illusion (for such I suppose it must be) has been experienced by others. It must be that we are so used to associating a flash with every sharp re-

port that the brain manufactures one when the real thing is absent.

We did not stop for the burst tire, but when the stable was reached discovered an "envious rent" through casing and inner tube which bade fair to lay us up for some days.

A Gasoline Runabout in a Doctor's Practice.

BY CHARLES P. TURNER.

My friend, the doctor, had bought an automobile. I had been out of the city for several weeks, and on my return the acquisition was announced with something like the show of pride that is generally thought to accompany the arrival of the first born, and my wife and self were bidden to take a ride at the first possible opportunity. Being an automobile enthusiast, I was elated at the prospect.

One bright Sunday afternoon the opportunity arrived. The dos-a-dos was attached to the machine (a popular light runabout), and with four adults aboard we started out for a run over the park boulevards.

It was then explained by the doctor that a growing practice made a better means of locomotion than a bicycle and the trolley cars a necessity. To board a horse in a livery would cost a great deal, and in addition the delay in getting the rig ready for an urgent night call would often be a serious disadvantage. His premises offered convenient storage facilities for the auto, which would therefore cost nothing for help, while the ease with which a start could be made by the simple turn of a crank and the greater speed possible with the machine would save much delay in answering calls.

The vehicle had been bought from one of the city stations, where it had been taken "in exchange for a larger car." It was fitted with "all the 1903 improvements," and, as the dealer promised to put it in as good running condition as a new machine, it seemed to be a bargain, so as we rolled rather leisurely out the avenue I congratulated the doctor on his good luck and complimented him on his rapid progress as a chauffeur.

It soon became apparent, however, that there was a deficiency of power. The batteries were new and there were no missed explosions, but it was impossible to attain more than a moderate speed on a level and a light up grade called for the use of the low speed gear.

While laboring up a 4 per cent. grade at a speed possible to a family horse, a machine of the same make but with only two people aboard sailed gently by on the high speed. Being of Kentucky birth and training, his natural sporting instinct made this almost unendurable to the doctor. Comparisons of his machine to a spavined old nag were somewhat freely indulged in, and it became apparent that pride in its possession was on the wane.

The boulevard with its grades lost its attraction and it was decided to take a run out the avenue, which was level enough to permit a comfortable speed. But even here there was trouble. A hissing sound indicated something wrong, and a flat rear tire showed where the difficulty lay. The outer tube was new, having been put on by the dealer when the machine was purchased, but the old inner tube was thought to be serviceable and had not been replaced. This, however, had already showed signs of weakness, and an inspection of the outer tube failing to reveal any signs of puncture, we decided that the inner had burst, and that under the terms of the dealer's agreement to put the machine in good order it was "up to him" to make the repair.

Being several miles from home and near the trolley line it was thought best for the sake of the outer tube to call on the dealer to come and get the machine, while the party returned somewhat crestfallen by trolley.

The dealer was requested to investigate the failure of the engine to develop its power and make any adjustments in the carburetor that might be required. An examination showed that the wire leading from the throttle had broken. With this repair made everything seemed to be in good working order again, and the doctor had several days' use of the machine that revived his interest in the automobile.

As a mechanical engineer, who had given the gas engine considerable special study, I was able to aid him in learning the principles governing the action of the motor and in locating the minor difficulties incident to its operation. He was an apt pupil and all went well until one evening, not long after he and his wife had made a call at my place with the machine, we were informed by telephone that on the road home the chain had broken and the doctor was again in trouble. Two or three hours' work in the dark served to connect up the broken chain, so that a run home was possible, and the next day the dealer was once more called on to make good his promise by replacing the chain, which showed evident signs of having been badly worn before the purchase.

The next mishap also occurred during an evening run. The engine had been working well, but after taking a stiff grade on the high speed it suddenly stopped and could not be started again. On taking out the spark plug to examine it for the trouble, the cylinder was found to be full of water, and the conclusion was at once drawn that the walls were cracked. A telephone message was sent to the dealer requesting a tow, but the garage was crowded with calls at that time and a long wait followed. In the meantime an employee of the station from which the machine was first bought came along, saw at once that the trouble was only a blown cut cylinder head gasket, and consoled the doctor by telling him that it was something likely to happen at any time, even to

a new machine. Under these conditions the dealer could not be held responsible for the repair. The next day, the repair station being crowded, a young college man, who was putting in his vacation learning the practical points of automobile construction, was intrusted with the job of putting in a new gasket. It was found that the exhaust connection to the muffler was so badly corroded by the hot gases that the muffler could not be disconnected, and the whole muffler had to be taken off with the cylinder head. No valve being provided between the tank and the carburetor, it was necessary to draw off all the gasoline, none of which was allowed for in the bill for refilling the tank. Finally, the young man was unfamiliar with that particular make of machine and had not taken the precaution to mark the worm gears when the cam shaft was taken down, in consequence of which a long time was taken in resetting the shaft so as to get the proper valve opening, all of which had to be paid for at the usual rate for such work.

However, the job was finally completed and the machine again taken for a run. On trial it was found that the wire leading to the muffler cut out had been connected up too short, so the cut out valve would not close, and a bad leak soon developed in one of the unions on the pipe from the gasoline tank to the carburetor. His experience with the repair men having been rather expensive and unsatisfactory, the doctor, after consulting with me, decided to do some repairing for himself, after which I was to accompany him for a ride. I planned to be present during the operation, but on my arrival at his place I found that he had been at work, with the result that the leak was thoroughly stopped by the use of some waste packed into the union. Also the wire to the cut out valve had been properly lengthened. We gave the machine a thorough inspection and oiling, and then started out. Everything seemed to work perfectly. There was scarcely a missed explosion during the run; the engine developed full power, climbed grades beautifully on the high gear and responded well to the throttle and spark. As we spun along the doctor's spirits, which had been considerably depressed by his experiences with the gasket and the repair men, began to return to something like the condition they were in when he first announced his purchase.

The fates, however, seemed loath to let him escape. When nearing home he turned into the car tracks to pass a loaded team. The pavement had lately been sprinkled, and it and the tracks were in the worst possible stage of greasiness. Before either of us knew just what was happening we felt the rear end of the machine make a sudden plunge and swing itself around the front until we were facing in the opposite direction. The skidding wheels stopped only when one of them

brought up against the curb with sufficient force to crack several of the spokes and give the wheel the appearance of those often seen on a darkey's ash cart.

I have often driven skittish horses that turned suddenly when frightened by some unexpected object in the road, but the suddenness with which that automobile changed ends was one of the greatest surprises of my life. A horse that could do as well would certainly be in demand for a rough rider exhibition. An examination of the damaged wheel showed that it would do to carry the machine home and to the shop for repairs.

Just at present the doctor begins to suspect that some of the advantages of the automobile over the horse are more apparent than real. I am in hopes, however, that he is having his worst troubles now and that experience in its use will enable him to avoid some of the accidents he has had. With a better knowledge of the construction of the machine and the acquisition of some skill in the use of tools he will also find that repairs will not be so numerous or expensive as to make the cost of owning an automobile excessive.

Motor Trucks for Railway Terminal Service.

The *London Railway News* gives some particulars of the actual experience of one of the English railway companies in the employment of a steam motor wagon for transferring and collecting heavy freight. The van in question has been in regular employment for the past six months, plying between a railway freight station and a mill two and one-half miles distant therefrom. At first the steam van only was used, but subsequently this was supplemented with a trailer. Four trips are made daily, for which loads are available one way only. There is a heavy grade against the load. The motor alone can carry from 15 to 16 tons daily, and, with the trailer, from 20 to 24 tons are hauled, the average load per journey being between 5 and 6 tons. Two men are sent out with the van, as against a man and a boy with a horse vehicle; but the van takes the place of four single horse wagons. The cost of these teams had been kept separately, so that exact comparison was possible with the cost of the steam van; and after six months' experience the railway authorities are satisfied that there is a saving in the employment of the latter. The cost of repairs to the motor, however, is still an unknown quantity, and should this be high as time goes on, and the parts wear out, the saving at present may be converted into a loss. The experience with this truck indicates that for hauling heavy loads between fixed points motor vans are more economical than horse traction; but where freight must be handled in small loads and distributed from point to point, single horse drays give the best service. Under these conditions, the advantage of the superior speed is not realized.

COMMUNICATIONS.

Explosion of Water Tube Automobile Boiler

CINCINNATI, Ohio, August 22.

Editor HORSELESS AGE:

The enclosed clipping from a Cincinnati daily is in the main correct. The automobile was a Mobile steam runabout which had recently been equipped with a Salamandrine boiler. While ascending the hill on Reading road, Mr. Blackmore, who was riding with Mr. Reinhart, called the latter's attention to the peculiar antics of the steam gauge. The machine was immediately stopped, and Mr. Blackmore took refuge behind the nearest telegraph post, while Mr. Reinhart turned on a steam water pump and then reached under the machine to turn the fire out, and while doing this the explosion occurred. I saw the machine later on, and the entire dome of the boiler was blown off. It went with such force that it took the seat with it, breaking it into a number of pieces. It was, indeed, fortunate the occupants dismounted when they did, as the statement that a piece of the boiler landed two squares away from the place of explosion is correct. Mr. Reinhart, being under the machine, was not hurt in the least. The explosion seems to have been caused by the boiler being entirely dry and very hot when the steam water pump was started and cold water forced into the boiler. I do not remember to have ever read of a boiler in a steam automobile exploding until this one let go, as described. I have always believed they would burn out, but not explode. Now I think I should not enjoy sitting over one.

L. S. COLTER.

The clipping referred to reads as follows:

"With a roar that brought hundreds to the scene, the boiler in the steam automobile of H. M. Reinhart, of the Diem & Wing Paper Company, exploded on Reading road, Avondale, Thursday evening, and Reinhart escaped death by a miracle.

"The auto was completely wrecked, and pieces of it were hurled two blocks from the scene. Reinhart was underneath the machine at the time trying to locate the trouble, and this saved his life, as the top of the seat and upper portions of the framework were hurled high in the air.

"It is thought Reinhart allowed the water in the boiler to run too low, as the machine came to a dead stop in front of 2000 Reading road. Reinhart had barely gotten beneath the auto when the explosion took place.

"Reinhart telephoned the Special Mobile Company, on Main street, of the explosion, and the wrecked machine was taken to its shops for reconstruction.

"Charles Blackmore, of Haddon Hall,

Avondale, Reinhart's companion, was on the ground by the machine when the explosion occurred, and his escape from death was as miraculous as Reinhart's."

Editor HORSELESS AGE:

Referring to the enclosed clipping regarding boiler explosion, can say it is correct. The auto was a regular steamer, in which the owner had installed a water tube boiler of the coil type, largely advertised as impossible to burn out. After ascending a short hill the operator noticed his steam go down and not seeing any water in the glass turned on the steam pump. Before doing so he took the sound advice of his companion and descended from the seat. As soon as the water entered the boiler there was a terrific explosion, throwing the seat high in the air and blowing out the burner and pipes. Examination after the accident showed the hood which is screwed on the centre standpipe to have torn loose and flying up straightened about a foot of the one inch pipe that is fastened to it and forms the outside coil of the boiler. The hood or drum did not separate from this pipe, but laid on top of the water tank. The explosion was evidently caused by the coils being red hot, and when the water entered the boiler could not hold the sudden pressure. The young men had a wonderful escape, and owe their lives to the fact of getting out before turning on the water, and this should be a warning to the users of this class of boiler.

G. S.

[This letter refers to another clipping on the same subject. It may be of interest in this connection to state that we had a letter from a reader in Omaha a few weeks ago who had had the same accident with the same kind of boiler.—Ed.]

The Cause of Muffler Explosions.

Editor HORSELESS AGE:

In the last instalment of Harry B. Haines' exceedingly interesting and humorous "Tales of Summer Touring" he inquires into the cause of muffler explosions. Their origin is very simple. Whenever the cylinder fails of an explosion the unburnt charge passes the exhaust valve upon its being opened by the cam and enters the muffler. If only one or two charges are missed the proportion of fresh gas in the muffler may be small in comparison with the burned gas which it contains from previous explosions, especially if the muffler be a large one. If, on the other hand, a large number of explosions are successively missed, the burnt gas may be entirely "scoured" out and its place taken by a perfect mixture of full explosive qualities.

Everyone has noticed the blue flame which passes the exhaust port when the exhaust pipe is disconnected, and upon an explosion in the cylinder with the muffler attached, this flame rushes into the exhaust pipe and muffler. When, therefore, after

missing a large number of explosions, the engine finally succeeds in securing an ignition, the exhaust flame reaches the muffler full of perfectly explosive gas which promptly explodes. Fortunately the muffler contents are only at atmospheric pressure and so the pressure of explosion cannot much exceed 100 pounds per square inch, but this is sufficient to wreck a weakly constructed shell. Every muffler ought to be designed to withstand 100 pounds per square inch internal pressure and a due factor of safety then allowed.

Failure may occur by splitting the shell along its length or by forcing off the heads through breaking the through bolt generally used to secure them or stripping its threads. The pressure upon a muffler 8 inches in diameter, tending to split the shell in the direction of its length along two lines diametrically opposite, may be 800 pounds per inch of its length. That is, the metal of the shell ought to be able to withstand a tensile stress of 400 pounds per inch of length. It is thus plain that no considerations of weight reduction ought to deter manufacturers from putting in the requisite metal.

ALBERT L. CLOUGH.

Taken in Tow by a Hearse.

Editor HORSELESS AGE:

An account of a recent short trip I took may be odd and interesting to some of your readers, as it was to many who happened to see it. Our good family doctor has been using an automobile in his practice for something like two years with marked success, but, like most of us, gets "hung up" now and then and needs help. This day, Sunday, his batteries ran out and he walked home, ate his lunch and then telephoned me, asking if I happened to have a set of batteries on hand to help him out. I said: "What I have you are welcome to, but I cannot vouch for their strength. If you will call for them I will go with you and, try and help you to get home." We reached the stranded auto standing right in the middle of the street in the mud, and went to work.

We soon found that my batteries did not help matters any, and so other things were tried. While working away a funeral procession passed us en route to the cemetery, and later, while still at work, a part of the same procession passed us on its way home, while still later came the hearse, with our good friend, the undertaker, on the box. I hailed him and asked for a rope. He had none, but, said he, "If a pair of lowering straps will do you any good I have them." "All right," I said, with as straight a face as possible, "back up your hearse and we will hitch on." He gave me a look, and so did the doctor, then pulled up the reins and backed up, and we hitched the auto to the rear axle of his hearse. I said, "Come, doctor, get into your auto and steer and you will reach home all right."

Our undertaker has taken a great many

men to their long last home, but never before or since an automobile.

F. P. WATERHOUSE.

The Automobile as a Peacemaker in Kentucky.

Editor HORSELESS AGE:

Having put our faith in a steam machine, we thought to get as much fun out of it as possible, and the first addition made was a 2 inch steam whistle with a foot button to operate the valve. With the 200 pounds pressure this gave all the excitement desirable.

One morning last spring we started on an early ride and about 6 o'clock came to a small village on the Lexington pike

what would perhaps have been another feud chapter in the history of Kentucky, and the credit is due, not to the presence of soldiers, but to the modern automobile.

A KENTUCKIAN.

The Auto. Equipment of a Californian.

SALINAS, Cal., August 8.

Editor HORSELESS AGE:

It was last December that I bought my first automobile. My two boys found that they could make considerable practical use of it, so I got another. Still there were not enough to go around, so I got a third one. All three are standard machines, one

dead still and refused to go for some time. We pushed it out of the ditch by hand, and then cranked again—but it was no go. After waiting for twenty minutes it still refused to go, but after repeated efforts I got it started. For the time being I could not tell, however, what was the matter.

When I went back to town I passed close by a street sprinkler. The car then made two or three kicks and nearly stopped again. Then I knew what was the matter. When I backed on the road I backed the car into a bunch of wet grass, and the fan on the back part of the machine threw water on the battery wire and caused a short circuit.

I like the machines very much, and I



A CALIFORNIAN AUTO. STABLE.

named Florance, described and made famous by Lloyd's book, "Stringtown on the Pike." When half way through we came upon two young men fighting desperately in the middle of the road. In the doorways on each side were women screaming and wringing their hands, while from a side door came an old woman with a rifle. Anyone familiar with the history of Kentucky will not envy our position at this time. It being too late to retreat, we, like the knights of old, charged the enemy with full steam ahead and whistle wide open. When within 20 feet of the combatants all thought of gore seemed to have left them, and their one object was to get away from the screeching thing that was almost upon them, so one went one way and the other the opposite. Thus ended

being air cooled, one water cooled by gravity circulation, and the other one also water cooled by means of a centrifugal pump. I have no trouble with either of them.

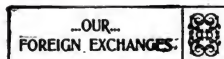
I have traveled about 3,000 miles with the different cars, and only once in all the distance did the machine stop on me that I could not tell what was the matter; nor did I find out for some time afterward. It happened like this:

I came to town early one morning, when I met a preacher on the street. He made the remark that he had never had a ride in an automobile, so I invited him to take a seat in my car. We went out into the country about 2 miles, when we concluded to return, and I backed on the road, in order to turn around. In doing so I backed into a bunch of grass, when the car stopped

think they have come to stay. In order to avoid trouble in running automobiles, one wants to become acquainted with every part of his machine, and know the why and wherefore of every movement. One should always make sure that his batteries are in good order, by testing them, and that the spark plug is clean and the porcelain not cracked, and all the wires connecting the batteries are screwed up tight. The insulation of the wires on the battery should be examined, and the tension on both the inlet and exhaust valves be adjusted so that the valves in working seat themselves well.

Under separate cover I send you a photograph of my automobile house with the machines in front of it.

DUNCAN MCKINNON.



The Laffrey Hill Climbing Contest.

The annual hill climbing contest on the Laffrey hill was held for the third time on Sunday, August 9, by the Automobile Club Dauphinoise, of Grenoble, France. The length of the course is 6.5 kilometres (about 4 miles) and the cars started from a standstill. The competing cars were divided into classes, as follows: Class A, voitures of 550 to 880 pounds; Class B, light cars of 880 to 1,430 pounds; Class C, heavy cars, 1,430 to 2,200 pounds; Class D, motor bicycles up to 170 pounds; Class M, single cylinder tourists cars; Class N, double cylinder tourists' cars with three passengers; Class Z, omnibuses with fifteen seats.

The best time up the hill was made by the Gobron-Brillié 100 horse power racer, which competed in the events at Nice last spring and in Ireland. It was piloted by Rigolly and made the dash up the hill in 5m. 33s., thereby gaining three prizes, that for the best time in Class C, that for first place in the general classing, and that for the best time made with an alcohol driven vehicle (Baron de Cater's cup.) Second place in Class C and in the general classing was secured by another 100 horse power Gobron-Brillié car. In the four cylinder tourists' car class (P) first place was secured by De Rougemont, who drove a 60 horse power Mercedes with four passengers on board up the incline in 7m. 15s.

On Monday, August 10, a standing start and stop race was held over a course at Uriage, measuring about 500 yards in length.

The conditions were for each car to start standing from a line, cover the 500 yards, and stop dead on a line at the end, time deciding the winner. In the event of any car going beyond the finishing line, it would have to reverse until actually on the line, and if stopped short of the line would have to bring the wheels up exactly to the

finishing point, and until in that position the time was debited to the competing car. Some very remarkable stops were made, and the whole of the competition brought out in very marked contrast the powers of judgment in stopping the engine, using the brakes, and other points of keen judgment, the race not necessarily being to the swiftest, as was shown by Rigolly, who with his 100 horse power Gobron-Brillié took over ten seconds longer to complete his run than several cars that he had previously beaten by minutes. The winners were Le Blon, on a Gardner-Serpollet car, and Rougier, on a Turcat-Méry, both tying with the time of thirty-nine seconds.

A New Form of Friction Clutch.

(Abstract from a paper read before the Institution of Mechanical Engineers, London, by Prof. H. S. Hele-Shaw.)

The friction clutches now in use may be classified as follows: (1) The cone clutch, where considerable pressure between the surfaces may be obtained by the wedge action of the cone; (2) various forms of rim clutch, in which the action is obtained by means of levers; (3) clutches with rings or segments expanding within a drum or annulus; (4) the brush clutch, in which brushes of wire are thrust into a finely serrated or grooved plate; (5) the coil clutch, in which a coil of metal or wire rope with blocks is employed to give great gripping power; (6) the "Weston" clutch, in which the friction effect is produced by a number of circular disks connected alternately with the driving and driven machine.

There are numerous modifications in detail of all these clutches, but the inventions in connection with them—which are very numerous—relate principally to the mode of obtaining the requisite pressure between the friction surfaces. Thus taking the case of the expanding ring or segment, which is one of the most successful forms, wedges, right and left handed screws and toggle joints have all been used in different ways for expanding the rings or segments; but

no clutches appear to have been designed for the purpose of allowing slipping to take place to any considerable extent, so as to prevent at the same time undue wearing and heating of the friction surfaces. These clutches, if not transmitting considerable power and not required to slip, serve their purpose very well. Some, such as the coil clutch, the "Weston" clutch and the expanding ring clutch, may be made to transmit great powers, but it may be safely said that not one of the foregoing clutches has yet been designed so as to be capable of slipping for more than a very short time without being seriously injured, even if the surfaces in contact were not actually destroyed.

There are plenty of illustrations in mechanical science where it has hitherto been impossible to reconcile conflicting conditions, such, for instance, as the variable change speed gear, especially when required to be of high power and high efficiency, and it is an important question whether the present case forms another example or not. The author believes there is a way out of the difficulty, and this he proposes to bring forward in the present paper. It is quite possible that there are other ways, and if engineers consider the matter of sufficient importance it may put them on the track of overcoming the difficulty by a way other than that here described.

Suppose a sheet of metal is pressed into a frustum, the section of the corrugation being the frustum of a cone, and that the disk is placed upon another one similarly corrugated. It will be observed that not only do portions of the frusta not make contact with each other, but there is also a space left between the flat portions of the disks.

By placing these disks together as in the figure, and turning one alternately to the other, an amount of friction is produced which depends on the acuteness of the angle of the frusta. If a number of these plates are now placed in a box of the type of the "Weston" coupling, so that the plates alternately engage with two sleeves, one connected with the driver and the other with



SERPOLLET OMNIBUS CLIMBING THE HILL



LAMBERJACK MOUNTING THE HILL ON A MOTOR CYCLE

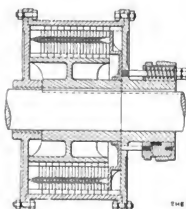
the follower, it will be found, first, there is very considerable gripping power; second, there is a tendency to part rapidly with heat, owing to the separation of the disks of metal.

By the ordinary theory of friction, the former effect—in a box of given length, if the gripping power is compared by actual measurement with the "Weston" clutch—will be found to be much greater, and yet this cannot be accounted for by the ordinary laws of friction, since the increased effect of the wedge action (which varies with the cosecant of the angle of the cone) is directly in proportion to the diminution in the number of plates which it is possible to put in a box, which diminution varies according to the same law. There is, however, a still more striking difference between the gripping action of the flat and corrugated plates when a lubricant is introduced.

Efficient lubrication of the surfaces in contact is insured by drilling the faces of the plates. The number of plates in a given space depends upon the angle of the corrugation; thus four plates with 30 degrees occupy the same space as six plates with 50 degrees. These four plates, however, give a better grip than the six plates with 50 degrees, and have the great advantage of allowing a freer circulation of liquid, as may be easily seen from the figure. The plates are also much more rigid with the more acute angle.

Peter's Two Part Wheel Rim.

The Mitteldutsche Gummi Waaren Fabrik, of Frankfurt on the Main, Germany, manufactures a double tube clincher tire with a special wheel rim in two parts, one of the flanges of the rim being taken off when it is desired to remove the tire. The tire is much the same as other double tube tires of the clincher type, except that it has a removable insert between the outer and inner tubes on the tread side. It is claimed that this insert protects the inner tube against injury by sharp obstacles, and even if a nail should penetrate the tread of the tire, the insert and the inner tube, the air



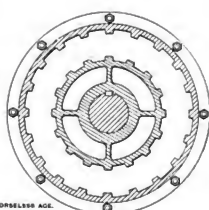
THE HORSELESS AGE.
NEW FORM OF FRICTION CLUTCH.

would escape only very slowly, as the insert will shift slightly within the outer tube, and thereby partially close the puncture.

One of the flanges of the rim is made separate from the rim proper, and is split at a certain point of its circumference. This loose flange is provided with a tongue which fits into a corresponding groove in the rim. The loose flange is provided near its two ends with inwardly extending lugs A, passing through a slot in the rim. These lugs are drilled and threaded (one right handedly and the other left handedly), to receive the oppositely threaded ends of the shank B. When the shank is entirely unscrewed from the lugs, the ends of the loose flange may be forced apart, and the flange taken off the rim. When the shank is screwed up tight in the lugs, it is secured from automatically unscrewing by means of a split passing through the hole through the shank B.

The Charron Ignition Commutator

The firm of Charron, Girardot & Voigt, Paris, have recently provided on their machines a novel combination commutator, commutating the current in the secondary and interrupting it in the primary circuit, thereby permitting the use of only a single coil for four cylinders. The device is shown in the drawing.



THE HORSELESS AGE.

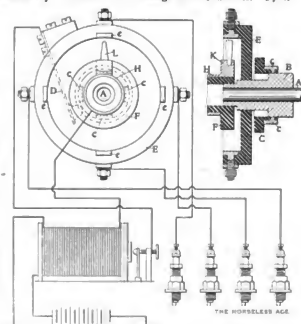
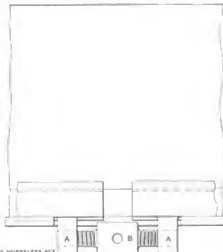
ing herewith, in which A represents the cam shaft, to which is fixed a metal sleeve B with stepped outer surface. Upon this sleeve is fastened a ring C of insulating material, which carries four contacts, cccc, in metallic connection with the sleeve B. These four contacts serve to lead the current from the battery into the primary winding of the coil at equal intervals four times for every revolution of the cam shaft, by means of the brush D.

Surrounding the sleeve B is a stationary disk E of insulating material, of relatively large diameter. This disk also carries four metal contacts cccc on the inner surface of a lateral flange. These contacts form the heads of bolts which extend through the flange and are secured in place by means of nuts. Other nuts upon the screws serve to secure the wire connections leading to the plugs in them.

The sleeve B also carries a second ring F of insulating material, the outer, reduced portion of which is surrounded by a metal contact ring H. A metal block K extends radially from this ring at a certain portion of its circumference and carries a metal pin L extending outward nearly to the inner surface of the flange on the disk E. Upon



THE HORSELESS AGE.
PETER'S TIRE AND RIM.



THE HORSELESS AGE.
CHARRON IGNITION COMMUTATOR.

the metal ring H bears a contact brush, which connects this ring to one of the secondary terminals of the coil. The brush is not shown in the drawing, but the sliding connection is indicated by the wire leading up to the ring H.

The various moving parts are adjusted relatively to each other in such a manner that when the brush D leaves one of the contacts *c*, the pin L is opposite one of the contacts *c*, so that the electric impulse produced in the secondary winding of the coil by the breaking of the primary circuit at contact *c* may jump from the pin L across to the contact *c* and from there pass to one of the spark plugs. An auxiliary spark gap is thus incorporated in the commutator.

The period of the spark may be varied by rocking the disk E around its support, by means of a mechanism not shown in the drawing, and as the brush B is supported by the disk E, both the primary and secondary contacts are varied by the same amount.

Members of the Royal Commission on London Traffic on July 31 made an inspection of the main outlets from London, under the auspices of the Automobile Club of Great Britain and Ireland.

A German contemporary states that the reason the rear axles of Keene and De Caters broke in the Gordon Bennett race was that they had put rubber buffers under their rear springs, while Jenatry did not use these buffers.

The Russian Government offers a prize of 50,000 roubles for a substance which will render alcohol unfit for drinking purposes without affecting its technical usefulness. Solutions proposed for competition may be submitted until July 1, 1905.

Superintendent Picton Philipps, of the Carmarthenshire (England) police force, is entitled to £50 per annum for the purpose of keeping a horse. The enlightened superintendent has just determined to keep an automobile instead, and the authorities have very properly decided that the £50 per annum shall in future be paid toward that purpose.

French exports of automobiles in 1902 amounted in value to \$5,310,000, and two French tire manufacturers are claimed to have manufactured \$4,100,000 worth of tires. The annual production of 70 French firms manufacturing automobiles is reported to be 12,000 cars, over 180,000 men being employed in the manufacture, the average annual wage amounting to \$360 per man.

According to a special dispatch to the London *Morning Advertiser*, dated Brussels, August 1, Prince Victor Napoleon met with a motor accident while traveling from Germany to Brussels. During the journey the motor got out of order, and the Prince, unable to remedy the defect,

had to walk to Arlon, a distance of 7 miles. It is not apparent why this little incident should be made so much of, unless it is the coincidence that nearly a century ago one of the prince's ancestors also "broke down" near Brussels and was obliged to abandon his vehicle.

Eugen and Richard Benz, sons of Carl Benz, have left the Rheinische Motoren Fabrik Benz & Co. in Mannheim and are organizing a new company to manufacture automobiles in Ladenburg, near Mannheim.

Baron Haas, an Austrian sportsman, recently made a tour with a 40 horse power automobile, traveling 3,435 miles, with three friends. He has made out the following estimate of cost: Gasoline, \$160; oil, \$50; tires, \$360; total, \$570.

"Every motor car shall emit a separate and distinct odor, which shall be registered with the County Council, and shall be easily recognizable at a distance of not less than half a mile."—Amendment to the Motor Cars bill suggested by *Punch*.

During the month of July 722 automobiles and motor cycles were imported into British ports, valued at \$1,052,590. Parts imported amounted in value to \$127,145. For the same month last year the value of imported cars amounted to only \$594,630.

The 350 kilometre race which was to be held in Italy this fall was prohibited by the authorities, and to take its place there will be an automobile flower carnival, two short distance motor bicycle races and other events, at Udine, Italy, September 8-13.

In the Imperial manoeuvres which are to be held by the Fourth and Twelfth German Army Corps this fall, the entire automobile division of the Railway Brigade will take part. Twenty-two automobiles will thus be at the service of the authorities for conveying persons and dispatches.

The 5 kilometre (3.1 mile) per hour regulation in the crowded parts of Brussels is likely to continue in force for some time. The Mayor is at present away on his vacation, and in answer to a deputation of the Chambre Syndicale de l'Automobile the Deputy Mayor said that nothing could be done in the matter until October.

The *Motor News*, Dublin, in a recent issue outlines a scheme for holding another Irish motor race—this time an international alcohol competition—over the Gordon Bennett course next year. The writer points out that if alcohol can replace gasoline as a motor fuel Ireland will benefit immensely, that country being very favorably circumstanced for the production of that fluid, which can be obtained from vari-

ous substances, such as potatoes, beet and peat, and, by a special process, from calcium carbide.

In Brussels, Belgium, an ordinance has recently been adopted which limits the speed of automobiles in certain streets to that of a walk. On complaint of the automobilists about the discrimination between their machines and horse vehicles, the latter have now also been included in the scope of the ordinance.

Professor Von Herkomer, the German painter, has presented a trophy valued at \$2,500 to the Bavarian Automobile Club for an international endurance competition. The points on which the award is based are excellence in general road work, hill climbing ability, efficiency of brakes and luggage capacity. This brings the international endurance contest suggested in *THE HORSELESS AGE* of July 15 last a step nearer realization.

On August 5 judgment was given in the Paris Court of Appeals in a case in which Count Charles Seldern claimed damages against Mr. Charley, the Paris representative of the Daimler Automobile Company, for selling him a second hand motor car as a new one. The sale was effected in July, 1901, the motor being a 35 horse power Mercedes. Eventually it met with an accident, and on examination the motor was found to have done service before. The verdict was for \$1,000.

A London paper states that the objection to automobiles of some members of Parliament is so strong that during the discussion of the motor cars bill they absented themselves, "because they could not be sure of controlling themselves." The feelings of a certain clergyman also got beyond his control, for he wrote to his representative in Parliament, Luke White, M. P.: "It is my full intention to decline in future to vote for any candidate for Parliament unless he pledges himself to go in for the total abolition of all motors. There is no language of any sort half strong enough to express my detestation of these damnable engines of Satan."

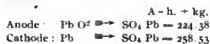
The engineering standards committee appointed by the London Board of Trade have decided to form a sub-committee, with Mr. Worby Beaumont as chairman, to deal with the standardization of the size, weight, power and E. M. F. of accumulators for electric motor vehicles. Lieut. Col. R. E. Crompton considers that the electromobile in its present form only requires careful management in one point—that is, as regards the care of the accumulators—and that in our present state of knowledge all that is necessary to deal with this defect is that the users should have as little to do with the charging, care and upkeep of the accumulators as possible.

Electric Couples.

(Abstract from a paper by G. Rosset, presented to the Second International Automobile Congress.)

LEAD ACCUMULATORS.

The theoretical specific capacities of the active materials in a lead battery, calculated by means of Faraday's law, are as follows:



In practice these limiting values are not nearly attained, and the best results (in round figures) are about fifty ampere hours per kilogram of positive active material—that is to say, only about 20 per cent. of the active material is sulphated and thereby develops electrical energy.

The state of division of the lead oxide is evidently of great importance, since the number of molecules in a given quantity of active material electrolytically accessible to the current depends directly upon it. Yet this importance must not be overestimated.

The manufacture of accumulators requires lead oxides of extreme purity, prepared specially for the purpose. These oxides are prepared from a base of new and very pure lead, and the oxidizing furnaces are heated with wood. These oxides must, therefore, not be conformed with the minimum and litharge of commerce, which are produced from old lead and from the residue of white lead manufacture.

At different periods it has been attempted to use spongy lead, prepared in different ways, to replace the ordinary oxides. But as the capacity obtained did not at all correspond to expectations based upon the special porosity of the spongy lead, it has been abandoned.

THE ELECTROLYTE.

For the electrolyte of a lead storage battery nothing but an acid solution can be used, the peroxidation of the lead by the current being only possible in an acid bath. The chemical nature of the lead requires that this acid should be diluted sulphuric acid, because the electrolyte takes part in the reaction, and the discharge of the cell is the result of the sulphation of all the molecules of the two electrodes which have taken part in the production of the current. There is, therefore, a minimum quantity of electrolyte for an accumulator of a given number of ampere hours.

To insure durability of the plates the acid must not be too much concentrated; the possibility of discharge, on the other hand, necessitates a certain concentration. These two considerations fix the extreme limits for the initial and final densities of the electrolyte at 1.28 and 1.12, respectively.

The acid electrolyte of the lead storage battery is of very high electric conductivity, particularly when compared with saline solutions, which have on an average from twenty-five to fifty times as great a resistance. The specific resistance of the acid electrolyte at its maximum conductivity (density, 1.215) is only 83 ohms per cubic centimetre. The conservation of the plates

requires that the sulphuric acid solution be diluted, strictly pure and, above all, free from all traces of chlorine, iron and nitrous products. Consequently, the acid employed must be extremely pure, and be prepared from a base of sulphur and not pyrites.

THE GRID.

The supporting grid is an element upon which much attention has been bestowed by inventors, who, unable to remedy the slight activity of ordinary oxide, have tried to reduce to a minimum the dead weight constituted by the conducting support of the oxide, and to give it a form better calculated to prolong the life of the plates.

The specific capacity of the plates has in consequence increased somewhat in recent times, but soon the minimum of weight which could reasonably be given to the grid was obtained, and no further progress in this direction was possible. Then it was attempted to still further lighten the grid by substituting for the alloy of lead and antimony some lighter metal, such as aluminium.

The nature of the metal of the grid is determined by two fundamental conditions: (1) The metal must not be attacked by the corrosive chemical and electro-chemical action of the electrolyte; (2) it must have a suitable electric potential with relation to the active material; the metal for the positive electrode must be electro-positive with relation to the positive active material, and the metal for the negative electrode must be electro-negative with relation to the negative active material. It is easily seen that in the opposite case the accumulator would discharge spontaneously by local action, and it would not be possible to charge it, the current passing to the grid of lower potential than the active material of the two electrodes.

Aluminium being unsuitable by itself, it has been tried to cover it superficially with lead. The protection obtained is illusory, because the coating of lead is attacked little by little, and finally penetrated.

The grid is constituted by two series of bars crossing each other, running horizontally and vertically, respectively. There is no type of grid which can be considered ideal, and to possess a maximum of advantages for all cases. The best form of grid depends on the oxide employed, the mixture adopted and particularly upon the nature of pasting or binding employed, because the active material drops from the plates in entirely different ways—sometimes as a large plate falling in a solid block; sometimes the action is of the nature of a superficial erosion. Consequently, a certain form of grid is best adapted to a certain process of manufacture, and is not at all suited to some other process, and this is the reason that some types of grids tried simultaneously by different manufacturers have been discarded by some and adopted by others, who found them unsatisfactory. These apparent anomalies are therefore perfectly explicable.

The progress made in lightening the grids has been such that at the present moment the ratio between the dead weight of the grid and the total weight of the plate is generally comprised between 20 and 50 per cent. Of course, the more the weight of the grid is reduced the more the specific capacity of the plate is increased; but it must not be forgotten that even if the active material would hold together of itself, a conductor penetrating entirely through the active mass would still be required. The weight of the support does therefore not tend toward zero, but toward a certain minimum. The results obtained may be considered so satisfactory that there is little hope for improvement in this direction.

THE SEPARATORS.

The separators in most common use at present are constituted by a sheet of ebonite perforated with numerous holes and corrugated to maintain the distance between plates, or, again, flat and provided at certain distances with vertical ribs serving the same object. Separation by corrugating the separator is evidently open to criticism, as it does not avoid short circuits by detached active material. In fact, the material remains in the corrugations instead of dropping to the bottom of the cell, and short circuits are sure to occur sooner or later through the perforations at portions of the separator in direct contact with the opposite electrode.

Ribbed separators, on the other hand, are more rational. Applied with their plane, perforated surface against the positive plate, they maintain the active material in place. The ribs insure the necessary distance between the plates. If active material is dropped it is most frequently from the positive plate, and the dropping particles must be very small to be able to pass through the perforations, and they will not remain between the two plates, causing short circuits, but drop to the bottom. Unfortunately, ribbed separators are very expensive, and are, therefore, practically out of the question for everyday practical use.

Attempts have also been made to provide the plate with an insulating and porous envelope to prevent all dropping of material. Different earthenwares have been experimented with, even the most brittle, as well as asbestos. In general, these separators slightly increase the internal resistance of the cell and retard the diffusion within the cell necessary to bring constantly new particles of the electrolyte in contact with the active material. For these two reasons such separators reduce the possibility of continued strong discharges. In addition, accidental tearing or cracking of the insulating envelope produces the phenomenon of "metal plating" of the porous body, which soon has ceased to be an insulator, and there is danger of the accumulator being ruined by short circuit.

M. Jeantaud has devised a separator of a new type, which combines the advantages of the ribbed and porous separators.

and is without the disadvantages of the latter—their fragility and want of elasticity; we refer to a separator of wood. Applied to the positive plate, it completely prevents shedding of the active material, there being no perforations. Owing to its thinness, it does not prevent the electrolytic exchanges or obstruct diffusion. The osmotic action insures greater uniformity of the electrolytic effect on the plates than with perforated separators. It is easily seen that a perforated ebonite separator only offers one-half of its section to the passage of the electrolyte and current, while a homogeneous substance like wood, forming an osmotic membrane, offers its entire section. It is for this reason that the electrolytic resistance of the two separators is practically the same.

THE CELLS.

The cells or jars for automobile storage batteries are made of ebonite. At one time cells of celluloid were used to some extent; but after a number of accidents, caused by short circuits and sometimes even by the heating of the electrolyte, their use was abandoned. Owing to the great inflammability of the material, celluloid is too dangerous for this purpose; and in view of the ever present possibility of sparks this type of cell is now only used for very small batteries, such as those used for ignition purposes, and then owing to the real advantage of a transparent cell and the facility of gluing celluloid by means of acetone. The cells are either molded or not; molded cells have the advantage of more accurate dimensions, which is of value when the cells are to be grouped in trays.

THE TRAYS.

The trays are made of wood, and are impregnated with hot paraffine to insure perfect insulation. The bottoms must be drilled with holes to permit any acid spilled over to drain off. Care must be taken that cells in trays placed side by side are not of too great a difference of potential, in order to avoid abnormal loss by leakage. This is generally accomplished by a careful study of the connections.

CONCLUSION.

In terminating this brief study of the lead accumulator, it seems appropriate to call the attention of manufacturers to the importance of improving the efficiency of transmission from the motor shaft to the road wheels. The electric motor is a comparatively perfect machine, in which there seems to be no chance for any material improvement. A storage battery is a reservoir of electrical energy of reasonable efficiency but of comparatively small capacity, which must be borne with for the present, owing to the want of something better. Consequently, the greatest economy of current should be aimed at. There are electric vehicles which, when running free, with wheels raised from the ground, consume from 8 to 10 amperes—750 watts, in round figures—which is lost in the transmission, consequently, there

seems to be considerable improvement possible in this part of the electric vehicle.

(To be continued.)

Licensed Association Meeting at Niagara Falls.

The Association of Licensed Automobile Manufacturers held a two days' meeting at Niagara Falls on Tuesday and Wednesday last, August 18 and 19. The meeting was attended by both commercial and technical representatives of the members, and the object of the meeting was, on the one hand, to consider plans of action for the association, and on the other, to discuss technical problems, particularly standardization. Twenty-five of the twenty-seven members were represented. President Fred L. Smith was in the chair.

The only information given out concerning the work that had been accomplished at the meeting was to the effect that a resolution had been adopted binding members to insert in all future contracts with agents a clause whereby the latter agree to handle only "licensed" machines, and that it had been decided to standardize certain parts of gasoline cars, such as spark plugs (as regards threads). The resolution adopted reads as follows:

Resolved, That all the members of this association from now on embody the following clauses in all contracts made by them with agents for the sale of their products, and in any and all arrangements, either verbal or written, in regard to the sale of vehicles, they conform in full with the spirit as well as the letter of these articles:

"In consideration of the fact that the party of the first part has obtained a license under Selden patent No. 549,160, and is paying substantial royalty thereunder, and has agreed as a condition of said license not to contest said patent, directly or indirectly, or aid others in so doing.

"Now, therefore, the party of the second part, in consideration of being appointed an agent for the sale and disposition of the automobiles manufactured by the party of the first part, agrees that during the continuance of such agency he will not infringe said patent, nor sell, keep on hand or dispose of, directly or indirectly, any automobiles containing the inventions claimed in said patent No. 549,160, not duly licensed under said patent."

This, as stated, was the only information of the proceedings of the meeting given out officially. A few things regarding the proceedings were learned from other sources than the officials of the meeting. The original program was changed somewhat at the last moment, and a prominent Western parts manufacturer, who was to make an address on standardization, was notified not to come unless requested by telegraph. Some decision was apparently reached which will limit the membership of the association rather closely, unless, as is possible, action on this

matter was deferred until the next meeting, which is to be held in New York city on September 23, either at the association's headquarters or at some hotel. At any rate, just before the meeting a considerable enlargement was anticipated, in outside circles at least, but this enlargement did not materialize.

The technical committee recommended the standardization of certain automobile parts and the recommendation was adopted. These will be issued in the catalogues of the members of the association. The questions of grades and prices were left to the individual manufacturers.

Club Notes.

ELGIN A. C.

Twenty-three automobilists of Elgin, Ill., organized an automobile club on August 13. L. B. Garrison was elected president and J. Thomas secretary.

BUFFALO A. C.

An automobile masquerade is contemplated in connection with the next run of the Buffalo Automobile Club, of Buffalo, N. Y., which will be to Echota.

A. C. OF PITTSBURGH.

Printed postal cards have been distributed among the members of the Automobile Club of Pittsburgh, Pa., to enable them to report promptly to the Department of Highways any dangerous defects they may find in the streets. At a meeting on August 18 a committee was appointed to take charge of the building operations of the new clubhouse and another to make arrangements for the contests which are to follow the end of the endurance run of the N. A. A. M.

KANSAS CITY A. C.

The club has decided to employ an attorney to look after its interests in damage suits against members and in all legislative matters. A committee will suggest some attorney for the place. The interstate meeting has been postponed until some time next month, on account of the bad condition of the roads. The following members were named as a committee to arrange a program: D. F. Piazzeck, William Huttig and H. C. Merrill. Another committee, composed of Louis Curtis, A. E. Hutchings and Dr. Henderson, has been appointed to select a design for a club button.

COLUMBUS A. C.

At a meeting held on August 14 the Columbus Automobile Club, of Columbus, Ohio, unanimously voted to join the N. A. A. The membership is 115. Committees for the race meet to be held on August 28 and 29 were appointed, as follows: Arrangements—Monypenny, Firestone, Anderson, Neil and Seeds. Advertising—Lear, Rhoades, Wolfe, Schumacher and Upham. Entertainment—Leid, Auld, Hempstead,

Davis and Frisbie. Transportation—Shedd, Avery, Bush, Monsarratt and Stone. Finance—Curtain and Watters. Prizes—Leid, Stone and Ross. Badges—Webb.

CLEVELAND A. C.

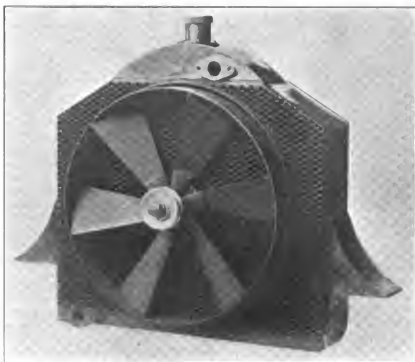
The second annual meet of the Cleveland Automobile Club is scheduled to be held at the Glenville track, Cleveland, Ohio, on September 4 and 5. Seven events will come off each day. The prizes will be sterling cups of special design, varying in cost from \$75 to \$200.

RHODE ISLAND A. C.

The list of events and prizes offered by the Rhode Island Automobile Club for the meet to be held at Narragansett Park on September 19 are as follows: First race, for gasoline machines weighing 1,200 pounds and under, five miles—First prize, \$100; second prize, \$50. Second race, for gasoline machines of over 1,200 and under 1,800 pounds, five miles—First prize, \$100; second prize, \$50. Third race, for gasoline machines of over 1,800 pounds, five miles—First prize, \$200; second prize, \$100. Fourth race, for steam regulation stock cars of all weights, three miles—First prize, \$100; second prize, \$50. Fifth race, open class, for stock electrics, two miles—First prize, \$100; second prize, \$50. Sixth race, open class, for single motor bicycles, five miles—First prize, \$50; second prize, \$25; third prize, \$10. The entries will close on September 17.

TOLEDO A. C.

At the last regular meeting of the Toledo Automobile Club, Toledo, Ohio, members submitted papers giving the name of their machine, its cost, length of time in service, cost of running, including gasoline, steam or electricity, cost of repairs, etc. Among those who presented figures were H. E. Fisher, Alfred C. Neel, Peter Gendron and Will W. Morrison. Mr. Fisher, who owns a Cadillac, bought his machine on May 6. The cost of first equipment was \$1,028. All repairs, gasoline, etc., to August 1 amounted to \$38.09. Mr. Neel bought a steam Locomobile in 1901 at a cost of \$700 and ran it that year at a cost of 1 cent per mile, covering 1,720 miles, and in 1902 1,576 miles. Oil and gasoline cost \$20.34; repairs and express, \$28.89; shed, tools, etc., \$43.70. So far this year he has run the machine 510 miles and the cost of everything has been \$30.65, including 100 gallons of gasoline, 55 of which are still on hand. Mr. Gendron, owner of a Winton touring car, had no trouble, with the exception of replacing the tires; the first month the repair and storage bills were about \$30. In July it was \$43.30, of which part was for 156 gallons of gasoline. Mr. Morrison, owner of a Winton touring car, ran his machine 3,000 miles in 1902 at a cost of \$60. This year he has had bad luck in several instances and the total cost of repairs and gasoline has been \$228.87, representing 3,000 miles of travel, or about 7-2 to cents per mile for repairs.



BRISCOE COMBINED TANK AND RADIATOR.

Briscoe Combined Tank and Radiator

The photo herewith shows a new radiator of the cellular type recently brought out by the Briscoe Manufacturing Company, of Detroit, Mich. The radiator is composed of copper tubing with hexagonal ends, and has a polished brass top and sides, and cast brass brackets. At the rear of the radiator is mounted a six blade fan with a rim

attached to the blades. All parts of the fan, including the pulley, are made of aluminum. This radiator is built in any size.

Large Bliss-Chester Radiator.

The Bliss-Chester Company, Providence, R. I., have recently built a radiator for 30 horse power cars, herewith illustrated. The



NEW AUTOCAR TONNEAU WHICH WAS DESCRIBED IN OUR ISSUE OF JULY 22D LAST.



BLISS-CHESTER RADIATOR FOR 30 HORSE POWER CARS.

radiator weighs 93 pounds, and consists of thirty-six tubes of three-quarters of an inch outside diameter. The total length of tube is 87 feet, not including return bends, and the over all dimensions of the radiator are 13x13x32 inches. This is probably one of the largest radiators yet built in this country.

The California Races.

The Automobile Club of California held a series of automobile races on the Del Monte track, Del Monte, Cal., on August 2. A change was made in the original program on Sunday, the 9th, and this accounted for the rather meagre attendance, estimated at 1,100. The event proved a thorough success in other respects, however, and a number of Pacific Coast records were smashed: in fact, new track figures for that part of the country were established for all distances up to 10 miles, the feat being accomplished by a 24 horse power Paris-Vienna Mors. The following cars took part in one or more of the various events:

Three Wintons, one Peerless, two Stevens-Duryeas, two White touring cars, one White stanhope, one Rambler, one Toledo, one Orient buckboard, and one Mors.

The fastest single miles were made by the imported French racer, owned and run by G. Whittell, Jr. It broke all existing Pacific Coast records. The fast miles by the Mors machine were 1:15 4-5, 1:15 4-5, 1:16, 1:16 1-5, 1:16 2-5, 1:18; by Hotaling's Winton under 1:35; by a Peerless 1:40, and by a Toledo 1:48. Experts judged the track fully to seconds slow because of soft spots and backstretch ruts and the flatness of the curves.

One of the interesting features of the day was the showing of Dr. Kellogg's little buckboard. The spectators were delighted when the little vehicle captured two large silver cups by taking second place in one and first place in another 5 mile handicap race.

Most of the races were decided in the first half mile, when some car took the lead and increased it. This stringing out of the

contestants made the events comparatively free from fights abreast round the curves. The French machine was the sensation of the day.

The results of the speed contests were as follows:

Two miles, gasoline machines, for silver trophy given by Pioneer Automobile Company — Rambler,

driven by Luckhardt, winner; time, 3m. 44s.

Two miles, open event, for silver trophy given by George E. Middleton—White touring car, driven by Grothe, winner; time, 3m. 34s.; Rambler, driven by Luckhardt, second, beaten 35 yards.

Five miles, open event, for silver trophy given by the White Automobile Company —White racing machine, driven by Garlutt, winner, time, 8m. 35s.; White racing machine, driven by Grothe, second.

Five miles, open event, for 20 horse power and under, for a silver trophy, given by the National Automobile Company—First heat, White racer, driven by Grothe, first. Time, 7:30 1/2. Fastest mile, 1:19. Winton, owned by F. C. Hotaling, driven by Hewson, second. Final heat, White, driven by Garlutt, winner. Time, 7:44 3-5.

Ten miles, open event, for any size machines, for a cup given by F. A. Hyde, president of the Automobile Club of California. Mors, owned and driven by George Whittell, Jr., winner by nearly half a mile. Time, 13:21 1-5. Twenty horse power White racer, driven by Grothe, second. Time, 14:06 1-5.

Five miles, for gasoline machines, 20 horse power or under, for silver trophy given by F. A. Jacobs. First heat—Winton, owned by F. C. Hotaling and driven by Hewson, first. Time, 7:44 1-5. Orient, buckboard, owned and driven by Dr. Kellogg, second. Time, 10:08. Final heat—Winton, owned by Hotaling and driven by Hewson, winner. Time, 7:40 2-5.

Five mile exhibition against time—Mors, owned and driven by George Whittell, Jr., made six consecutive miles as follows: 1:16 1-5, 1:15 4-5, 1:16, 1:16 2-5, 1:15 4-5 (making 6:21 for the five miles and 1:16 1-5, making 7:37 4-5 for six miles).

Five mile handicap for Del Monte trophy and second prize of a silver cup, open event, run off in squads of three machines each.—White Stanhope, driven by Grothe, first, actual time, 7:45 4-5, allowance 2:00 resulting time, 5:45 4-5; Orient buckboard, driven by Dr. Kellogg, second, actual time 10:01 4-5; resulting time, less allowance, 6:25 1-8; Peerless, driven by Andrews, third, actual time 8:27, resulting time, less

allowance, 6:27; Rambler, driven by Luckhardt, fourth, actual time, 8:57 2-5, resulting time, less allowance, 6:27 2-5; Toledo, driven by Keenan, fifth, actual time, 9:08, resulting time, less allowance, 6:28; Mors, owned and driven by Whittell, sixth, actual time, 6:28 4-5, no allowance. Winton, owned by Hotaling and driven by Hewson, seventh, actual time, 7:55 4-5, resulting time, less allowance, 6:30 4-5; Winton, driven by Fuller, eighth, actual time, 9:13, resulting time, less allowance, 7:03.

Five mile handicap for silver trophy given by L. P. Lowe, for owners, open to all machines.—Orient buckboard, driven by Dr. Kellogg, winner; actual time, 10:30; Winton, driven by George Fuller, second, actual time, 9m. 42 2-5.

Cincinnati Automobile Races.

Nearly fifty automobiles were entered in the six automobile events given under the auspices of the Hamilton County Agricultural Society at Oakley Park, Cincinnati, Ohio, on August 18. Coroner Weaver was the starter and Drs. Jacob A. Haerr, W. J. Milner and L. S. Colter acted as judges.

The results were as follows:

First Race—On motor cycles, for 3 miles. Frank Vormohr, first, Olin Ross, second, Doc Fisher, third. Time, 3:08.

Second Race—Automobiles; 5 miles. Sid Black, first; J. Harry Waters, second; J. H. S. Stricker, third. Time, 8:40 1/4.

Third Race—Five miles. S. Crain, first; T. F. Bradley, second; W. T. Duckwell, third. Time, 9:34 1/4.

Fourth Race—F. F. Bradley, first; A. J. Smith, second; W. T. Duckwell, third. Time, 1:08.

Owing to an accident to Messrs. Crain and Schultz in the fifth race it was run by F. F. Bradley, Jesse Lippincott and Charles Hanauer. Time for last 3 miles, 5:56.

The sixth race was won by Sidney Black, with F. F. Bradley second and Charles Hanauer third. Time, 7:59 1/2.

Mr. Black was disqualified in the third and fourth races on the ground that his machine was too speedy to be entered.

Trade Literature Received.

Northern Electrical Manufacturing Company, Madison, Wis.—"Northern Steel Crane Motors."

John W. Brown Manufacturing Company, Columbus, Ohio.—Circular describing automobile oil lamps.

The Cudell Motor Company (J. C. Brandes, to West Thirty-third street, New York city).—"The Cudell."

The C. H. Blomstrom Motor Company, River street and Clark avenue, Detroit, Mich.—Circular relating to a gasoline automobile manufactured by this firm.

Sunlight Lava Manufacturing Company, Chattanooga, Tenn.—Circular of lava burner tips for automobile searchlights, etc.

Packard Transcontinental Tourists Complete Their Journey.

Tom Fetch and M. C. Krarup arrived in New York city in their Packard touring car late on Friday evening, August 21, after having been on the road for two months and one day. Colonel Pardee, the New York agent for the Packard car, invited a number of press representatives to accompany him on a trip out from New York city to meet the tourists. The party proceeded out in a half a dozen cars of the company and some of private owners and proceeded to a hotel on the Speedway, where they awaited news regarding the whereabouts of the transcontinental car. From there the party proceeded to Yonkers and Tarrytown, at which latter place they caught sight of "Old Pacific" at about 6 o'clock p. m., all plastered over with mud, the wheels being almost solid, there having been rather severe rains up State recently. After a photo had been taken, the homeward journey was started upon, "Old Pacific" keeping in the lead, thus showing that it was really none the worse for its long journey, as far as going ability was concerned.

It was intended originally to run the car to Coney Island and have the front wheels washed by ocean water, which would have afforded a somewhat more ceremonious ending to the tour and fittingly complemented the start, which was made with the rear wheels rinsed by the retreating waves of the Pacific. The tourists were fagged out, however, and, as they were of the opinion that from San Francisco to New York city would in future be regarded as a transcontinental trip, they

abandoned the last part of their original program and wound up at the Packard station in West Fifty-ninth street.

Accidents.

While en route from Cleveland, Ohio, to Painesville on August 22, the automobile of W. H. Kirkpatrick backed down a steep grade near Little Mountain and upset. The four occupants were pinned under the machine, and Mrs. Kirkpatrick sustained injuries which resulted in her death. The others, Mrs. Kirkpatrick, mother of Mr. Kirkpatrick; Mr. Cavanaugh, who is connected with the Hartford Rubber Works, and Mr. Kirkpatrick, were severely injured.

During the automobile races of the Hamilton County Agricultural Society at Oakley Park, Cincinnati, Ohio, on August 18, two accidents occurred in the fifth race—a 5 mile dash for a first prize of \$100. The machine of Walter S. Crane swerved and fell over upon him, causing severe bruises. Immediately afterward the tire of the automobile of Charles Schultz came off, and the axle breaking. Mr. Schultz was thrown 15 feet into the air and rendered unconscious.

M. Combes, the Premier, has sent a circular to prefects throughout France instructing them to annul all mayoral ordinances which limit the speed of automobiles unless they also apply them to every other form of vehicle. This administration measure is taken to mean neither more nor less than that automobiles are no longer to be treated as pariahs in the world of transport.

MINOR MENTION



J. Pollitt & Co. have opened an automobile storage and repair station at 254 Glenwood avenue, East Orange, N. J.

The Danbury (Conn.) Track Association has under consideration the introduction of automobile races at the fair next fall.

Frank B. Leland has advised the Detroit and Birmingham Toll Road Company to make a uniform rate of 1 cent per mile to all automobilists using their toll roads leading into Detroit, Mich.

It is reported that Mia Alix, who is said to hold the world's records for women automobilists, has asked a St. Paul promoter to arrange a date for her to race against anyone, regardless of sex.

The Packard Motor Car Company, of Warren, Ohio, is said to be having some difficulty in finding enough cottages suitable for about 250 employees it wishes to take to Detroit, Mich., when its new factory is opened.

In the race events of the Knights Templar Triennial Conclave Association at Louisville, Ky., on August 15, "Barney" Oldfield won both races against Harry Cunningham, of Detroit. Of the amateur races E. B. Ayres won the two mile race, which was for cars of not more than 1,200 pounds weight, in 4:17 2-5, and J. Kemp Goodhue the second race of two miles in 4:33 4-5. Winston Walker, sixteen years



MEETING THE "OLD PACIFIC" AT SLEEPY HOLLOW, TARRYTOWN, AND A PART OF THE ESCORT TO NEW YORK CITY.

old, sent a buckboard against time in 4:33-4-5. The races were preceded by a parade through the principal streets, in which about fifty machines participated.

A 5 mile motor cycle race was held at the track in Belleville, N. J., on August 23. A diamond medal was given the winner.

An automobile plant to cost \$1,000,000 will, it is reported, be established at Wilmington, Del., by Frank B. Jones and other Philadelphians.

The N. A. A. M. has sent out during the last week copies of the rules of its coming endurance contest to Pittsburg, accompanied by entry blanks.

Negotiations for the consolidation of the Wisconsin Wheel Works, of Racine Junction, and the A. J. Pierce Engine Company, of Lakeside, Wis., are reported pending.

Charles B. King, the well known auto specialist, has been appointed superintendent of the factory of the Northern Manufacturing Company, of Detroit, Mich.

The National Auto. and Mfrs. Co., of San Francisco, inform us that L. Andrews, accompanied by R. C. Lennie, made a new time record of 5 hours 50 minutes between Del Monte, Monterey and Oakland, a distance of 135 miles, in a Peerless touring car; the previous record was 6 hours 5 minutes.

What may be described as "progressive" automobilism is indulged in by the cottagers on the south shore of Lake Archer, North Attleboro, Mass. Recently the colony, which has been dubbed "Automobile Row," held a progressive dinner, going in their machines from one cottage to another for the several courses.

Owing to the lack of hills in Indianapolis, Ind., for thoroughly testing automobiles as hill climbers, an artificial climb 22 feet high, with an angle of 40 degrees on the ascent side and 35 degrees on the descent side, has been built at Twenty-eighth and Meridian streets. Carl Fisher is reported to be the prime mover.

Banker Brothers Company, of Philadelphia, report the following sales of automobiles for the week ending August 22: White, to W. H. Jones, of Philadelphia; Peerless, to Joseph H. Schnitzel, of St. Louis, Mo., and to Valentine L. Franz, of Philadelphia; Antocar, to Walter B. Smith, of Overbrook, Pa., and to J. Ross Snowden, of Mt. Airy, Pa.

A dispatch says that Robert C. Vandercook, an editor, and Prof. John H. Gray, of Northwestern University, of Evanston, Ill., have started on a tour to investigate the feasibility of substituting auto trucks for horses where railroads are not available, as a means of reducing the cost of transporting the products of the Big Horn Valley, in Western Wyoming.

Two unique uses have been found for automobiles by Rev. E. J. Blekkink, of Detroit, Mich., and J. W. Hutchinson, of Sioux Falls, S. Dak. The former has bought a 5 horse power gasoline runabout to assist him in performing his pastoral

duties, and the latter, who is game warden of Minnehaha County, has contracted for a machine adapted for hunting prairie chickens.

Entries have begun to be received for the endurance run of the National Association of Automobile Manufacturers from New York to Pittsburg.

Arrangements are being made for an automobile meet at Daytona and Ormond, Fla., next winter, and it is expected that it will be the largest in its history.

It is reported that a part of a new building which is being planned for the Brecht Butcher Supply Company, of St. Louis, Mo., will be equipped with machinery for the manufacture of automobile frames.

The United States Department of Agriculture, Office of Public Road Inquiries, Washington, has issued a reprint from its year book containing an article on the "Use of Mineral Oil in Road Improvement," by James W. Abbott.

A telegram from L. J. Phelps, of Stoneham, Mass., dated at the Summit House, Mt. Washington, August 25, states that he succeeded in ascending Mt. Washington yesterday with one of his touring cars in the time of 1 hour and 46 minutes.

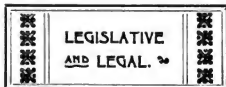
The addition to the factory of Thomas B. Jeffery & Co. at Kenosha, Wis., is being pushed to completion. The building is of concrete construction throughout and is 275x56 feet. An extensive power plant is being installed. Designs are now being made for a further addition. The company's half mile testing track is nearly completed also. A tract of twenty-six acres adjoining the original Sterling plant has been purchased.

A survey of the route on the west side of the Hudson River as far as Kingston is being made by Secretary Unwin for the purpose of determining whether it or the route already surveyed on the east side is best adapted for the proposed endurance run of the N. A. A. M. next October. A new route from Buffalo to Cleveland will also be surveyed. At the same time arrangements will be made for hotel and garage accommodations, etc.

The program for the fall race meet of the Cleveland (Ohio) Automobile Club, on September 4 and 5, is as follows:

September 4.—Two mile race for cars weighing 1,000 pounds or under, all powers; 5 mile handicap for members, each car to carry four passengers and equipment; 5 mile race for cars weighing 1,800 pounds or under, all powers; 10 mile open; 10 mile handicap, three minute limit; 1 mile race for electric; special trials for records.

September 5.—One mile race in heats, best two in three, flying start; 2 mile race for cars weighing 800 pounds or under; 5 mile open; 10 mile handicap for cars weighing 1,800 pounds or under, three minute limit; 5 mile race for cars weighing 1,200 pounds or under; 10 mile handicap, three minute limit; special trials for records.



The Nashua, N. H., city government has passed an ordinance which places the maximum speed of automobiles at 6 miles in the compact part of the city.

A meeting of creditors of the Spaulding Automobile and Motor Company, of Buffalo, N. Y., will be held at the Bankruptcy Court in that city on September 7.

L. J. Hammond has been appointed receiver for the General Automobile and Manufacturing Company, of Cleveland, Ohio. The debts aggregate \$50,000, it is said.

Hugh Maher was held in \$250 bonds on August 19 for alleged threatening to kill and attempting to extort \$500 from J. C. and Ernest Pickering, whose automobile recently broke down near his farm at Morse, Ia.

Julius Fleischmann, mayor of Cincinnati, Ohio, is reported to have paid about \$300 on account of his chauffeur, who was arrested at Kingston, N. Y., last Saturday for reckless speeding and endangering the lives of Judges Alton B. Parker and Van Etten.

Nearly 200 licenses covering auto trucks have been issued to date by the New Jersey Secretary of State. Twenty-two were issued to New York houses doing business in New Jersey. The total number of licenses so far issued is 3,568, and it is estimated that it will reach 4,000 by September 1.

Orders have been issued to the police by Commissioner Greene, of New York city, calling attention to the recent decision of the Court of Special Sessions that the licensing section of the Bailey automobile law is unconstitutional, and forbidding further arrests of automobilists whose vehicles do not bear license numbers.

The Board of Park Commissioners of Louisville, Ky., has decided to take away the licenses of all automobilists who may abuse the privilege of the park driveways. To date two automobile owners have been deprived of their licenses, and many complaints have been lodged with the board, which has issued about 100 automobile licenses.

As it is said to cost three times as much as the fines amount to to enforce the Bailey automobile law in Suffolk County, N. Y., the District Attorney is quoted as saying that unless the fines are increased he will withdraw the offer of \$25 reward for each arrest and conviction of offenders. He thinks that the fines imposed should be sufficient to reimburse the county, but says that before taking any radical steps he will communicate with the justices of the peace, recommending that notices be served on automobilists that

heavier fines will be inflicted hereafter for violations of the law.

About 1,000 automobile licenses had been issued by the Highway Commission, Boston, Mass., up to August 15.

Up to July 25 the total number of automobile licenses issued in Cleveland, Ohio, was 919. This is an increase of 550 for the past twelve months.

Missouri automobilists are obliged to pay \$2 for a State license, the same amount for a license in each county in which the vehicle is used, and taxes on it to both city and county.

David B. Roberts, chauffeur for ex-State Senator Francis Maxwell, of Rockville, Conn., pleaded guilty last week to driving his automobile at illegal speed, and was fined \$24.55, which was paid.

Peter Van Vlissingen has brought suit against Police Justice David S. Ely, of Evanston, Ill., in which he is charged with extorting \$1 for a bail bond in the matter of the arrest of Mr. Vlissingen's chauffeur for illegal speeding. The legal charge is said to be 50 cents.

An automobile ordinance has been unanimously passed by the Salt Lake (Utah) city council, making unlawful a speed of more than 8 miles an hour, and 4 miles at crossings. Automobiles must be registered and numbered, and infractions are punishable by fines of \$100 or 30 days in jail, or both.

City Electrician Ellicott, of Chicago, Ill., is quoted as having said that another war will be begun at once to compel all automobile owners to place numbers in a fixed position upon their machines, and that he will continue until all have complied with the requirements of the ordinance. He is satisfied that some owners are accustomed to trade their numbers with each other.

While surveying the roads near Hackensack, N. J., on August 19, Secretary Harry Unwin, of the N. A. A. M., came upon a fence which had been erected half way across the road, and from which a chain was stretched to a post, completely blocking the way. It seems that the toll taker had been notified to stop the big car he is touring in, as it did not have a New Jersey license number. He was fined \$15 and costs by a justice of the peace.

Stockholders of the defunct Remington Automobile Company, of Utica, N. Y., have been notified to show cause on October 6 why an order should not be issued allowing the receiver to sue them. President Foster has called a special meeting of the board of directors of the Chamber of Commerce, through whose instrumentality the company located at Utica, when steps will be taken to protect those whose subscriptions were secured through that organization.

It has often been proposed to abolish the House of Lords, but the English motorists feel more like abolishing the Commons.



United States Patents.

736,216. Separator for Secondary Batteries.—Abraham F. Clark, of Philadelphia, Pa. August 11, 1903. Filed July 22, 1901.

A separator designed to insure the isolation of plates and at the same time positively support the grates of the grid and the active material held therein, confining the latter in contact with its metallic conducting and supporting frame.

The positive pole plates are made up of a grid with grates or cross bars and side pieces. Into the spaces formed by the cross bars the active material is pressed. Interposed between the negative pole plates are the separators, made up of a series of cross bars, shaped so as to enter a space formed between the grates of the grid and the active material. The cross bars of the separator are held together by means of triangular ribs, and the separator, comprising the cross pieces and ribs, is formed of some non-conducting material capable of being molded—such, for instance, as hard rubber, porcelain, earthenware, celluloid and the like. The ends of the separator are provided with side frame pieces, adapted to rest within the side pieces of the positive pole plate, which are wider than the separators, and the side frame pieces of the separator are notched to correspond with the cross section of the cross bars.

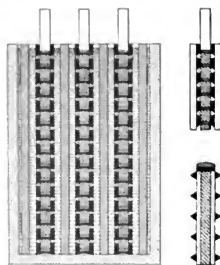
736,153. Attachment for Hydrocarbon Burners.—F. A. Reynolds, of Lewiston, Me. August 11, 1903. Filed July 11, 1902.

To prevent popping of the burners, the flame from accidentally going out and from flushing back through the burner, a screen of fine mesh is placed between the mixer of the burner and the nozzle which supplies the vapor to the mixer. The desired result can be accomplished by affixing the screen to a light tube adapted to fit the mouth of the mixer, and the apparatus or attachment can be very easily adjusted.

736,172. Vehicle Driving Gear.—M. W. Talen, Carl F. Pearson, Erick B. Christopher, Gustaf E. Johnson and Lars A. Lindberg, of Chicago, Ill. August 11, 1903. Filed October 30, 1902.

This invention relates to a combined change gear of the planetary type and a spur differential gear. Contrary to prevailing practice, the gear receives its power through a sprocket wheel and transmits it through a divided shaft. The change gear is shown on the left in the drawing herewith and the differential on the right.

736,192. Steering Mechanisms for Motor Vehicles.—Thomas W. Barber, of London, England. August 11, 1903. Filed September 2, 1902.



No. 736,216.

736,217. Secondary Battery Plate and Method of Making Same.—A. F. Clark, of Philadelphia, Pa. August 11, 1903. Filed December 28, 1901.

736,132. Gas Engine.—Herbert H. Mulherin, St. Louis, Mo. August 11, 1903. Filed March 2, 1901.

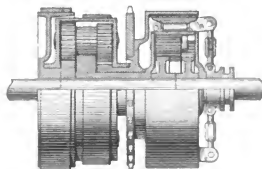
Describes a double opposed cylinder engine, the cylinders being in line with each other and one of the connection rods forked at the crank end and connected to two crank pins, the crank pin for the other connection rod being between these two and at 180 degrees from them.

735,774. Driving Gear for Automobiles.—Kirk G. Johnston, of Piqua, Ohio. August 11, 1903. Filed December 10, 1902.

735,820. Method of Treating Lead Plates for Use in Secondary Batteries.—Charles J. Reed, of Philadelphia, Pa. August 11, 1903. Filed February 1, 1902.

The inventor says: "I first subject a metallic lead plate of suitable form and dimensions to the action of a suitable acid in gaseous condition—such, for example, as hydrochloric acid gas—in a closed receptacle, preferably in conjunction with an oxidizing agent—such, for example, as nitric acid, nitric peroxide, chlorine or bromine—thus producing a layer of lead chloride. I prefer to employ an oxidizing agent in connection with gaseous hydrochloric acid for converting lead into lead chloride on account of the more rapid conversion thus produced.

"In order to form the active material to be



No. 736,172.

utilized in secondary batteries, I reduce the lead chloride formed as above specified to spongy metallic lead either by electro-chemical action or by the reducing action of metallic zinc or some other suitable reducing agent. Instead of reducing the lead chloride to spongy metallic lead it may be converted directly by electro-chemical action into lead peroxide, which is also an active material for secondary batteries."

736,398. Air Pump.—Louis E. Hoffman, of Cleveland, Ohio, August 18, 1903. Filed November 20, 1902.

Relates to an air pump for use on a steam car.

The parts shown are supported on a fixed portion of the vehicle. The inlet valve is at the bottom of the pump barrel and the outlet at the side. The trunk piston of the pump is connected to the oscillating pump rod by a wrist pin. The pump rod has a notch which takes the pin on the lever to start the pump, and the engagement or disengagement may be effected by appropriate movement communicated to the pump rod from a foot button through a bell crank and connecting rod. A spring attached to the bell crank lever normally throws the notch of the pump rod out of engagement with the pin. When the foot button is depressed, the pin slips into the notch and the pump is actuated. To take up the variation of length necessary to the reciprocation of the pump rod and piston the connecting rod is divided into two parts, one of which is sleeved over the other and connected to it by a spring. This allows sufficient extension of the rod to accommodate the variation.

It will be seen that the pump is immovable, which is an improvement over those pumps which oscillate with the stroke. It is necessary only to swing the pump rod to put the pump in operation. The gear is suitably located under the floor of the vehicle body, and the stem of the foot button extends through the floor to bring it in convenient position for the driver.

736,683. Anti-Skidding Device for Vehicle Wheels.—Samuel Butler, Westbury-

on-Trym, England. August 18, 1903. Filed April 18, 1903.

736,638. Tire.—Walter P. Scofield, Gainesville, Fla. August 18, 1903. Filed March 4, 1903.

736,734. Electric Igniter for Internal Combustion Engines.—Lewis Jones, Washington, D. C. August 18, 1903. Filed February 21, 1903.

736,735. Piston.—John C. Junkin, Grafton, N. Dak. August 18, 1903. Filed March 28, 1903.

736,737. Sparking Igniter for Explosive Engines.—Arthur A. Karcher and Douglass E. Karcher, Lyons, Mich. August 18, 1903. Filed February 12, 1903.

736,789. Electromagnetic Friction Clutch.—Wenzel Schuster and Heinrich Ast, Vienna, Austria-Hungary. August 18, 1903. Filed July 10, 1902.

736,807. Internal Combustion Engine.—Charles A. Wilkinson, Worcester, Mass. August 18, 1903. Filed November 14, 1901.

736,906. Sprocket Wheel.—Freeman R. Willson, Jr., Worthington, Ohio. Original application filed February 20, 1901. August 18, 1903. Divided and this application filed May 20, 1903.

736,415. Changeable Speed Gear.—Walter L. Marr, of Detroit, Mich. August 18, 1903. Filed February 19, 1903.

In a changeable speed gearing, the combination of a driving shaft, a sleeve loose on said shaft and having a squared portion, a two part clutch, one part of which is secured to the sleeve and the other part secured to the shaft, a pinion mounted on the squared portion of the sleeve to move longitudinally thereon, a gear loosely mounted on said shaft adjacent to the end of said sleeve, a sprocket wheel secured to said gear, teeth on the hub of said gear and teeth on the hub of the pinion adapted to engage said teeth on the gear, a casing and gears mounted in the casing for transmitting motion from the said pinion to said gear when the pinion is moved to disengage its teeth from the teeth on the gear.

736,494. Reservoir for Motor Vehicles.—Ferdinand Charron and Léonce Girardot,

Paris, France. August 18, 1903. Filed April 22, 1902.

736,414. Pneumatic Tire.—Paul W. Litchfield, Akron, Ohio. August 18, 1903. Filed April 24, 1902.

Australian Patents.

(From Phillips, Ormonde & Co., 533 Collins street, Melbourne, Victoria.)

Improved Means for Removing the Rubber Tires of Bicycles and Other Vehicles.—Samuel Nicolson, of Medway street, Gore, New Zealand, and W. H. Paterson, of Broughton street, Gore, aforesaid. No. 20,534. In the State of Victoria.

Improved Adjustable Sprocket Chain.—T. H. Williams, of Mokoan West, near Benalla. No. 20,571. In the State of Victoria.

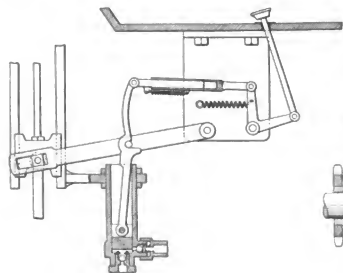
Improvements in Tire Constructions.—Edwin Phillips, of 533 Collins street, Melbourne. (Com. by John Clarence Cole, U. S. A.) No. 20,577. In the State of Victoria.

An Improved Mud Guard for Cleaning Cycle and Other Wheel Tires.—James Kinsella, Russell street, Camberwell, and R. T. Paterson, of 275 Flinders lane, Melbourne. No. 20,587. In the State of Victoria.

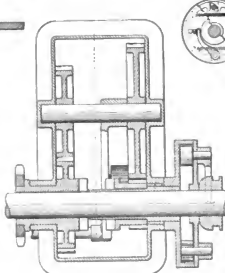
Improvements Connected With Anti-Skidding Devices for Motor Vehicles.—Samuel Butler, of Henbury Hill, Westbury-on-Trym, Bristol, England. No. 13,251. In the State of New South Wales.

Improvements in or Relating to Brakes for Cycles and Similar Vehicles.—A. W. Humphreys, of corner of Adelaide road and Brown street, Wellington, New Zealand. No. 15,215. In the Colony of New Zealand.

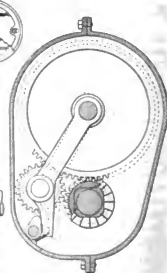
Improved Brake Apparatus and Means for Operating Same and Inflating the Tires of Bicycles, Motor Cars and Similar Vehicles.—H. J. Bettany, of Examiner street, Nelson, New Zealand. No. 16,327. In the Colony of New Zealand.



No. 736,398.



No. 736,415.



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Devoted to
Motor
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COMMUNICATIONS.—The Editor will be pleased to receive communications on trade topics from any authentic source. The correspondent's name should in all cases be given as an evidence of good faith, but will not be published if specially requested.

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Automobile Touring.

Touring by automobile is one of the most enjoyable recreations of modern times. It is in some respects comparable to yacht cruising, but fortunately it is open to a much larger class. There is hardly an owner, even of that class of car not specially built for touring, who does not venture on a trip occupying several days during the summer or fall months. Vacations spent in an automobile have become very popular, and the summer resorts have this season attracted large numbers of automobiles.

One often meets with the expression "touring fad," intended to convey the idea that automobile touring will command popular interest temporarily only. While this may prove true with regard to certain outgrowths of the touring movement, automobile touring itself will undoubtedly remain, as there is nothing to take its place. There is no comparison between touring by railroad and steamboat lines and automobile touring. The former mode of travel may be most convenient to those who want to make a trip to the large cities, but most owners of automobiles are city dwellers, and at periods of leisure during the warm season long to get out into the country where they may enjoy the healthful, invigorating air and "nature's beauty undefiled." For exploring sections of the country noted for their scenic attractions the automobile is unequalled. In the New England States, and, in fact, all down the Atlantic Coast, it is impossible to make a several days' trip without encountering charming views of mountain landscapes, river valleys and fertile fields.

Perhaps no better example of the superiority of automobile travel over railroad travel for enjoying the beauties of nature could be mentioned than a trip from New York to Philadelphia. A railroad trip over the main line between these two cities is devoid of all scenic interest, the tracks being skirted for a good portion

of the distance by marshy, barren lowlands, while a route for an automobile trip between these two cities can easily be laid out to include many sections of rare scenic beauty and to lead over well paved highways nearly the entire distance.

The great advantage of automobile touring over railroad travel is the independence it gives the tourist. He starts and stops at any convenient time of the day, and when he finds a place particularly to his liking he remains as long as he pleases, dividing his time between the different places visited according to their degree of interest to him. All places are accessible to the automobilist, instead of only those along the main lines of travel.

The Licensed Association Situation.

Apparently a new chapter in the history of events connected with the Selden patent and Licensed Association began last week, when Walter H. Chamberlain, a patent attorney of Chicago, concluded an agreement with the Patent Title and Guarantee Company, of 149 Broadway, New York, whereby the latter offers to conduct any litigation brought against independent manufacturers under the Selden patent and to indemnify them in case of judgments under this patent. The Patent Title and Guarantee Company, it is announced, will undertake to assume the risks of litigation, not only of automobile manufacturers, but also of parts manufacturers who have been declared "contributory infringers" by the Licensed Association. Mr. Chamberlain states that in this manner the independent manufacturers will be able to secure protection much more economically than by forming a pool similar to the Licensed Association, but no information as to terms offered nor of arrangements concluded with independent manufacturers is yet obtainable.

It is obvious to any thoughtful observer that the validity of the Selden patent must sooner or later be brought to a definite

test, as many of the independent manufacturers will not withdraw from the field simply for having notice of infringement served upon them, and the life of the Licensed Association depends upon its activity. It is yet too early to state whether the patent will be tested in a suit defended by the Patent Title and Guarantee Company, but such are the indications. The officials of the company state that they fully expect to be forced to defend a suit brought under the Selden patent.

In an interview the manager of the Licensed Association made the statement that he considered the action of the Patent Title and Guarantee Company of little importance. He said that Mr. Chamberlain had approached the association some months ago, intimating that he had discovered in the Patent Office files a patent clearly anticipating Selden's, and offering to be retained by the association. The association found, however, that the patent in question had been fully considered by the lawyers making the search for the Electric Vehicle Company prior to its acquisition of the Selden patent, and therefore rejected Mr. Chamberlain's offer.

It should be stated in this connection that in the announcement of the Title and Guarantee Company no reference is made to any anticipatory patent.

The Endurance Contest Rules and Passenger Capacity.

One of the new features of the rules which will govern the endurance contest to Pittsburg next month is the rule requiring every competing vehicle to carry a load of at least 30 per cent. of its own weight, either in passengers alone or in passengers and ballast. In previous contests rules regarding the number of passengers to be carried have often been lacking, while in other cases it was stipulated that the car should carry its full complement of passengers. The latter seems the most reasonable and practical provision. The change from this rule to that requiring a load of at least 30 per cent. of the weight of the car to be carried was made, we understand, because in the case of convertible two and four passenger vehicles the term "a full complement of passengers" would not be definite.

In our résumé of the rules a few weeks ago we observed that the rule specifying the proportion of load to be carried would encourage refinement in design, and was therefore commendable. Upon further

consideration we find, however, that there are a number of objections to this rule, and learn that several manufacturers intending to enter cars take exception to it.

There are at present upon the American market a number of two passenger cars which weigh close up to 2,000 pounds, while the average weight of cars for only two passengers is probably somewhat below 1,000 pounds. We presume that the object of the builders of the heavy cars is to provide greater comfort for the occupants, and to make the cars more powerful and durable. These objects are certainly attainable in this way, and the heavy car possesses, therefore, a *raison d'être*. It might be an injustice to the light car to expect it to compete in the same class as the heavier one, but as the heavier cars must necessarily be more expensive, they would compete in a different class from the light machines.

If the manufacturers of heavy two passenger cars wish to run them in the endurance contest they will be obliged to carry a considerable amount of ballast or dead weight for which the cars were not designed. This will place them at a great disadvantage, as the strain on the springs, for instance, would be enormously increased by 200 to 300 pounds additional dead weight. The effect of the rule requiring a load of 30 per cent. of vehicle weight can therefore only be to keep such vehicles out of the contest.

The Legislative Aspect of Touring.

Interstate touring is hampered considerably the present season by automobile laws which require tourists as well as resident automobilists to register and to carry a license number issued by every State in which they travel. Connecticut is the only State making an exception to this rule. The law is recognized as unsatisfactory, however, by many of the State authorities, and the tendency is to ignore it; yet, for the present, it is undoubtedly the safest plan to fully comply with the laws of the different States when a tour is made.

Copies of the different State laws, if the automobilist does not already have them in his possession, can be obtained from the Secretaries of State, who must be addressed at the various State capitals. Registration is required in Massachusetts, New York, New Jersey, Pennsylvania and the District of Columbia. In Massachusetts automobilists must register with the

State Highway Commission, in New York and New Jersey with the Secretary of State, in Pennsylvania with the prothonotary of their local county, and in the District of Columbia with the secretary of the Board of Commissioners.

During the coming winter it is likely that amendments will be added to most of these State laws, exempting tourists who have complied with the laws of their own States from the annoyance of further registering.

Automobiles for the Army.

General Nelson A. Miles, who was recently retired from active service in the United States Army, has always been in favor of using motor wagons for military purposes, and in his last official letter to Secretary of War Root, which has just been made public, he makes a number of recommendations regarding possible improvements in the army service, and draws attention to the growing importance of the bicycle, the motor bicycle and the automobile in army equipment. These vehicles, he states, have now been developed to such an extent that they have become most valuable means of communication and transportation. It is suggested that five regiments of cavalry be abandoned and a corps of five regiments be organized and thoroughly trained in the use and care of these modern vehicles. "It should be regarded as a flying corps or a corps of observation, to open the way for the advance of an army, to obtain information, to reconnoitre the country and to repair or build roads and bridges. Officers and men of the cavalry, artillery and infantry and of the quartermaster's and medical departments and engineer and signal corps should serve two or four years with this corps."

Calendar of Automobile Dates and Events.

- September 4-5-Cleveland Races.
- September 6-13-Vienna Automobile Week.
- September 7-8-Detroit Races.
- September 11-Syracuse Races.
- September 16-14-English Reliability Trials.
- September 19-Narragansett Park Races.
- September 13 of 19-Empire City Track Races, Yonkers.
- September 23-Meeting of the Association of Licensed Automobile Manufacturers.
- October 2-Brighton Beach Races.
- October 5-Paris Cab and Delivery Wagon Trials.
- October 7-14-New York-Pittsburg Endurance Contest.
- December 10-25-Paris Automobile Exhibition.

TOURING IN

✧ ✧ AMERICA.

IX.—Western Adirondack Region.

By C. H. GILLETTE.

The mountain region of the Adirondacks is an irregular oval containing between 7,000 and 8,000 square miles, excluding the cleared and cultivated land about its borders and the cleared spaces in the middle of the tract. Geographers have

dacks are published. They have their uses for those people who wish to go a-camping and a-tramping, but none of the authors has thought of the automobilist as a tourist through this wonderful region.

To begin with, there are only one or two logical bases for a touring automobilist to start from; and they are Saratoga or Glens Falls, preferably the latter, just south of the extreme southern foothills of the mountains. From Saratoga one has to pass through Glens Falls, so that the latter will be considered the base for this article.

From Glens Falls the plank road skirts

various other lakes and points of scenic interest.

The route to Long Lake is about 75 miles, and the other to Saranac Lake is approximately 120 miles. While either of these routes will take several days to complete, the tourist need have no fear of hotel accommodations on the road, for along these highways are some of the most famous of the Adirondack resorts. In practically all the towns along the way a supply of gasoline can be obtained, and in a great many repairs can be attended to.

From Warrensburgh, taking the left road following the right bank of the Hudson



WHERE WHITEFACE MOUNTAIN TOWERS OVER THE ROAD.

made all sorts of divisions of the mountain region, but the truth is that none of these is either logical or useful to one who does not know the vast wilderness. The Adirondacks are seen in probably their most picturesque aspect in Essex County, the mountains there being higher and the lakes and valleys wilder than in any other portion of the region. This does not imply, by any means, that the rest of the territory is not worth a visit, for there is scarcely any part of this section but has its peculiar charm.

Several excellent guide books giving information with regard to touring, camping, hunting and fishing in the Adiron-

French Mountain, going through the village of that name, to Caldwell or Lake George, at the southern end of Lake George. To get into the heart of the mountainous region the straight macadam turnpike to Warrensburgh must be followed, not taking, as in the route along the western shore of Lakes George and Champlain to Rouse's Point and Montreal, the road to the right along the shore line.

From Warrensburgh several excellent trips—long and short—can be made. The two principal ones are to Long Lake and to Saranac Lake, and there is also opportunity for a number of short side trips to

River, the mountains begin to assume that aspect of grandeur which, 20 or 30 miles beyond, becomes almost overpowering. As they grow larger and larger, mile after mile, their proportions, which no word picture nor artist can portray, but to which only a visit can do justice, begin to be realized. To the west rise Pine Mountain, Crane Mountain, Gage Mountain, against a background of the loftier ranges far distant. Northward are Mount Hoffman and Ragged Mountain, and a hundred peaks beyond.

Until North Creek is reached the Hudson River road is a little hilly, though in fairly good condition. About 8 miles be-



(Courtesy of New York Central and H. H. R.R.)

"THE ROAD TO THE NORTH END OF UPPER SARANAC LAKE."

yond Warrensburgh it crosses the river to The Glen, where it gradually leaves the river and runs through Wevertown to North Creek. A longer but better conditioned road from Warrensburgh is the right hand highway through Chestertown, Riparius (where the Hudson River is crossed) to Wevertown. Just west of Chestertown is Friend's Lake; to the east and northeast are Schroom River, Horicon and Brant Lake, and to the north is Schroom Lake. Just out of the town the road turns sharply to the right past Loon Lake, a little beyond which it again turns to the right through Riparius, crossing the river to Wevertown. Here you take the main highway turning to the left to North Creek.

From North Creek a circular route to Long Lake and return, through magnificent mountain and lake scenery, can be made—about a good two days' run, allowing for stops to admire and photograph (for you shouldn't tour the Adirondacks without a camera) the many views that you come upon.

Following the Hudson River on the south side, the river is met again at North Creek, and crossing North River beyond you finally come upon a road in Indian Lake Post Office leading to the south, which runs to beautiful Indian Lake. A side trip along this road, well worth a day's stop, follows the west shore of Indian Lake to Lewey Lake and as far beyond as you may wish to go. The road is not of the best and is hilly, but still it is well worth while.

The region in the vicinity of Blue Mountain Lake is notable chiefly because of the large lumbering industry which centres at this point. The lumbering region extends through to Raquette Lake. Much of the wild land in this vicinity has recently been acquired by William Rockefeller, who is fostering the timber of this section with the supposed purpose of

making an immense preserve here. From Indian Lake the Blue Ridge is seen in the distance. After crossing Cedar River and passing Little Rock Lake you begin to draw very near Blue Mountain Lake, north of the Blue Ridge. When this lake has been seen and enjoyed the only regret remaining is that there is not a good road leading to Eagle Lake, Utowana Lake and Raquette Lake, to the west of Blue Mountain Lake. The two first of these small lakes, small only in comparison with the last named, are at the northern foot of the Blue Ridge, which in places falls precipitously into their waters.

A few miles farther from Blue Mountain Lake Post Office is a group of three small lakes, connected with each other by little streams. They are called ponds—Mud Pond and South Pond to the west of the road and Salmon Pond on the east—no doubt because they are dwarfed in comparison with the other lakes in the vicinity. They are a group which empties into Long Lake through a mountain brook passing the town of Grove. Beyond these lakes a few miles the road meets and follows the eastern shore of Long Lake to Long Lake Post Office.

Long Lake is a considerable body of water, 14 miles in length and 1 mile in width. It receives the waters of Raquette Lake at its head and gives them up to the Raquette River at its feet. Its shores are strikingly diverse at different points, showing bold cliffs, gentle slopes, overhanging trees and beautiful sand beaches at intervals along their extended reach.

West of Long Lake there is a myriad of smaller lakes, which to hunters and fishermen are famous as spots dedicated to gun and reel. The canoe, too, figures largely in sport there, for nearly all these lakes are connected one with the other by streams navigable by small craft. From the shore opposite to Long Lake Post

Office a road practically impassable for an automobile runs due west to the north shore of Little Tupper Lake and West Round Lake. Perhaps a few days' tramping afoot into that wild country along the west shore of Long Lake would add to your stock of photographic treasures and zest for the return trip along the northern road to North Creek. However, when you have finally started your car eastward you will regret that your cry is not still "Westward ho!" Long Lake and the towering ranges of mountains beyond and all the things of beauty you have seen have a plamor which makes you look out of the back of the tonneau more than once.

Scarcely have you gotten out of the sight of the town of Long Lake, when, stretching from the right to the left before you, loom Mount Joseph, Mount Goodenow, Baldwin Mountain, Mount Catlin and Moose Mountain, the horizon of which is blended into a continuous waving line. But by the time you have reached the southern shore of Rich Lake and Lake Harris, its neighbor beyond, Mount Goodenow seems to have jumped almost on top of you, and you follow the shore road along its feet with mystified eyes gazing upward. Then, equally sudden, Baldwin Mountain, on the other side of Lake Harris, cranes its neck to look down upon you. These two lakes, Rich and Harris, together with Lake Catlin, not long left behind, are the source of perhaps the most wonderful scenic river in the world—the Hudson. From this magnificent scenery—impressive beyond words—as its fountain head, it would seem that the Hudson drew its grandeur and could not be other than it is. After crossing the Hudson River at its mouth at Lake Harris, you mentally compare it as you see it there with the grander stream at, say, Tappan Zee.

At a point a few miles farther there is a fork in the road. The right road—a hilly

one, unfortunately—makes an interesting side trip to Tahawus. Tahawus is about 7 miles east of Newcomb. It is chiefly remarkable as being the spot where the Tahawus Club has leased the hunting and fishing privileges, consisting of nearly 90,000 acres, and extending to the upper Au Sable Lake on the east and from the Lower Works to include Lake Tear of the Clouds and Lake Colden at the north, with headquarters at the Upper Works. It may be of interest to note that the first steel manufactured in the United States was made here at Adirondack. The MacIntyre Iron Company is composed entirely of the descendants of the original three owners of the property. A bit of history of a later date is the fact that Vice President Roosevelt while visiting at Tahawus in 1901 became President of the United States.

North of Tahawus the road runs to Lake Sanford; that to the south and east goes to the feet of Sand Point Mountain and Boreas Mountain. But to continue the route back to North Creek the right hand road at the forks is taken. Aiden Lair is about the first town for nearly 10 miles, and you there pass between Lake Balfour and Hewitt Lake through Minerva, and after crossing the Hudson River again reach North Creek. From there you retrace your way to Glens Falls.

The other and longer route—that to the Saranac lakes—goes along the same road as the first described route to Long Lake as far as Warrensburgh. If in the Long Lake route you took the longer though better road from Warrensburgh, you would run over the same ground as before as far as Chestertown. There, instead of taking

the left road to Loon Lake, you turn to the right and following the banks of a stream finally reach the lower end of Schroon Lake. At this point there is a fairly passable road running in a northeasterly direction along the lake shore and along the foot of Park Mountain to Adirondack and Watch Rock, beyond which is Pharaoh Mountain.

Schroon Lake, with its environs, is one of the most popular semi-wilderness resorts in the country. It is surrounded on all sides by mountains, not high, but wild and rugged and broken into curious fragmentary masses around its south end, growing smoother toward the north. It is nearly 10 miles in length, about 2 wide, and divided in two nearly equal portions by approaching points at the "narrows." It receives the waters of Paradox and other lakes and streams on the north, and empties through Schroon River into the Hudson River at Thurman's. The shores are low, receding in gentle slopes for a distance, then rising up into the mountains.

As the little lake steamer swings slowly round and starts away on her 9 mile trip through the lake we see that the mountains are all around, and although other lake gems may have a grander setting there are few with greater variety and none with more inviting shores. On the southwest are the great rough mountain ribs and hobs that gather around Pottersville; toward the north they soften down for some distance, then beyond are seen the sharp outlines of the Blue Ridge with glimpses of Mount Dix, The Dial and numberless nameless peaks that cluster

around Tahawus—the cloud splitter—seen at one point faint and blue with distance.

The village of Schroon Lake is at the head of the lake. It is a thoroughly wide-awake town, with good mail, telegraphic and telephonic communications with the outside world, water works and many other improvements. There are many excellent and well known hotels on the shores of the lake in that vicinity. The main road is along the west shore of Schroon Lake, through Taylor's-on-Schroon, South Schroon and many famous resorts.

To the northwest are Hoffman Mountain and Blue Ridge, not the Blue Ridge towering over Blue Mountain Lake, but another that from a distance looks down upon Schroon Lake. Due west, scarcely discernible on the distant horizon, you may catch occasional glimpses of the other Blue Ridge.

(To be concluded.)

One of the longest tours in the Middle West this summer was accomplished by Mr. and Mrs. Volney S. Beardsley, of Shelby, Ohio. They started out on July 7, and in four days reached Chicago, a distance of 409 miles. The roads in Indiana were found to be the best on the trip. Milwaukee was reached on the 18th; on Sunday, the 19th, a trip was made out to Oconomowoc and back, a distance of 75 miles, covered in four hours and a half running time, the roads being in good condition. The itinerary included parts of Minnesota and Dakota, and Omaha, Kansas City and St. Louis.



"TO THE RIGHT OF THIS ROAD TOWERS MOUNT AMERSAND, BENEATH WHICH LIES ROUND LAKE."

Preparation of the Car for a Tour— Necessary Supplies and Spare Parts

By ALBERT L. CLOUGH.

The supplies and tools which should be selected as part of the equipment for an automobile tour depend largely upon individual judgment, the type of the machine, its carrying space and the character of the country to be traversed. If one wishes to become nearly independent of outside assistance, or is going to tour a sparsely settled rural district where repair shops are widely separated, quite a long list of supplies and tools must be carried; while if repair shops are to be found at frequent points along the route, one may rest content with a very moderate freight of absolute necessities.

BLACKSMITH SHOPS AS REPAIR STATIONS.

It is the expressed experience of many tourists that repair shops should be avoided as far as possible, and the writer has found that the blacksmiths, as a class, are much more satisfactory than the alleged repair men. The better class of blacksmiths are on the average much better practical machinists than are the "mechanicians" of the avowed repair stations, when heavy carriage work is to be performed, as the latter are mostly graduates of the bicycle industry, with its flimsy traditions. For any job of filing, fitting, forging or welding the blacksmith is in his element; most of them carry taps and dies of the American standard sizes, quite an assortment of steel and iron, and the necessary drills and punches, and it is surprising what a good substitute for a broken casting a good blacksmith can make when required. When it comes to lathe work, the truing up of surfaces and the cutting of odd threads, the machine shop must be sought.

A great deal depends upon knowing just what one needs to have done. The average blacksmith or machinist knows nothing about automobiles, while the repair shop man "knows all about them." If one is mechanically inclined and can tell definitely what he wants and stand over the artisan until it is properly completed, he will have infrequent use for the services of the professional repair man, but if he is untechnical and is simply conscious that something has gone wrong and "the thing won't mope," he had better go to the nearest official repair station.

American machines, especially of the touring type, have been much improved in regard to their carrying capacity for tools and extras, but it is not expected that any one automobilist would expect to carry all the articles to be enumerated here. Among the articles suggested some may perhaps be selected by the reader as of possible use. In cases in which two or more machines are touring in close company, a greater range of supplies may conveniently be carried, as they may be divided among them. After considerable use of a machine, its operator knows its weak points, and the troubles like-

ly to arise from these must be, as far as possible, provided for in each individual case by a supply of the spare parts which have shown weakness.

LUBRICANTS.

Cylinder oil is the only lubricant which it is absolutely necessary to carry in considerable quantities. It is almost impossible to obtain it in rural districts. Steam engine cylinder oil is generally to be found in every village, but gas engine oil is usually unobtainable, except by a happy chance, outside of the large towns. If it is of the right quality it can be used "at a pinch" for the lubrication of all parts of the machine. Machine oil can be obtained anywhere, and no large supply need be carried, but Miller's grease for use in screw cups is not to be found in the smaller towns and must be carried. If the supply of gas engine cylinder oil runs short, steam engine oil may be used for the splash lubrication of gears and in many places where grease is intended to be fed. The main thing is to keep enough gas engine oil on hand for the cylinders. There is no substitute for this, and no such thing as successful running without it.

TIRES.

If single tube tires are used, at least one spare tire, known to be in perfect condition, should be carried, together with a bottle of shellac or liquid glue and a few spare screws for attaching the tire lugs to the rim. If the double tube tire is employed a spare casing and several extra inner tubes must be taken along, together with the special tire tools, some sandpaper, talc powder, a tube of rubber cement and some patches. It is always well to have a few spare tire valves and, of course, one of the folding jacks which are now on the market would be very convenient, but not absolutely necessary, as blocking, a long wooden lever and many willing hands are generally to be found. Extra tire bolts should be carried, and a large stock of patience and perseverance.

A good pump should, of course, not be forgotten. Some automobilists have made successful temporary repairs upon single tube tires, especially of the smaller one, by means of the rubber band and cement method, and some have accomplished the same result by the use of the metal screw plugs which are on the market. Repair kits containing these supplies may be taken, if desired.

Rope for winding a deflated tire may be obtained almost anywhere and is useful as a last resort to enable one to run to a repair shop.

THE ENGINE.

An extra exhaust and inlet valve and a spare spring for each should certainly be carried, together with coarse and fine emery for grinding in the valves. If the engine has valves with detachable cages, the spare valves, already ground to their seats in the new cages, should be taken along as a matter of convenience. If there are any gaskets used in the con-

struction of the motor, spare ones, cut to a perfect shape, should be included, as well as a bottle of shellac. Extra nuts of correct sizes for all doubtful points may easily be carried.

IGNITION.

Sometimes the construction of the motor is such that the entire contact device for jump spark ignition may readily be removed. In such cases it is well to carry a spare one complete, except cover, as it weighs but little. If it is of the platinum tipped screw and steel spring type, at least an extra screw and spring should be included. The construction will suggest at once in each individual case what parts are most likely to break, wear out or become lost.

Extra spark plugs for the jump spark system should, of course, be taken in liberal numbers, and if the contact spark is employed, a complete sparkler should be carried, with an extra flange gasket if the old form is still retained. Extra springs for contact sparkers may be included. Of course, all batteries should be brand new when starting on a long tour, and there should be two separate sets. Cells sealed in a case are to be avoided, as one bad one throws all of them out of service. The cells should be separate, and then a faulty one may be cut out. A pocket voltmeter is useful, not only for testing the power of individual cells with the current flowing, but for locating bad connections or broken wires by giving a strong deflection when its terminals bridge the defective point. Some rubber covered cable of about No. 16 will be found very useful in replacing bad connections and in cutting out weak cells.

THE COOLING SYSTEM.

If the circulating pump is chain driven, a complete new chain ought to form a part of the outfit. If direct connected, a spare flexible joint may be necessary. Extra packing for the pump gland may not come amiss. A serving of friction tape will often reduce a leak in rubber hose connections, or indeed in metal circulating pipe, and is generally "handy."

THE RUNNING GEAR.

A supply of spare nuts for all parts of the running gear, brake and steering mechanism is of value, and a comparatively small number of standard sizes will be sufficient to cover all cases arising upon modern American vehicles. With cars of foreign manufacture it is especially necessary to carry spare nuts, as the threads which they use cannot be duplicated in most hardware shops. Extra chain links should certainly be carried—a supply of the ordinary links and a master link. Where the wheel or axle bearings are other than plain, an extra cage of balls or rollers, or a set of cups, cones and balls, may be included, as circumstances demand.

TOOLS.

There are usually some special wrenches or spanners which are furnished with each

particular make of machine, and it is of special importance to see that these are not forgotten. Among the other tools which will be found most useful, and many of which are included in the usual kit, may be mentioned a large monkey wrench, a small bicycle wrench, bar or S wrenches for standard nuts, a small Stillson, a pair of Bernard parallel jaw cutting pliers, a cold chisel or two, a good sized flat file, a small half round file and a three cornered file, a good jackknife and a small punch or drift pin, one of the small pocket tool chests containing a variety of tools, large and small screwdrivers, and a machinist's hammer.

GENERAL.

A good supply of cotton waste should be taken along and a cake of strong soap; and a coil of soft iron wire of manageable size should be included, as many uses will be found for it. Calcium carbide for the lamps and a burner cleaner (if acetylene lamps are carried) should be included.

THE FINAL GROOMING OF THE MACHINE

Before starting should be very thorough. It should be completely stripped so that all parts of the mechanism shall be in full view. The crank case cover and gear case cover should be removed and everything should be inspected for tightness and correct adjustment. Tires should be looked over and inflated, all nuts of the running gear, and most especially of the steering gear, tried for tightness, and the latter properly lubricated; wheel and axle bearings properly oiled and tested for correctness and permanence of their adjustment, the tanks and gasoline and water piping inspected for leaks, the carburetor cleaned and the float tested for tightness, the brakes scrutinized with the utmost care as to their adjustment and the tightness of all their nuts; the clutches tried as to their adjustment and freely lubricated; the chain treated with graphite, adjusted to the correct degree of tightness and the fastening link inspected.

When inspecting the engine one should make sure that the connecting rod bearings upon the crank pin are secure and possess no undue looseness, that the flywheel key has not moved and that there is sufficient oil in the base for splash lubrication. The compression should be tried and, if not sufficient, the defect should be remedied. The cylinder lubrication should be seen to be sufficient and regular and the supply adequate. One should not be satisfied to think that every wearing part is receiving the proper amount of oil. He must know it absolutely, if perfect results are desired.

The gears in the transmission case must have a sufficient amount of oil in which to run and the draw-off plugs and covers must be securely fastened in place. Spark plugs must be cleaned and every electrical connection tested for tightness. The contacts in the spark timer and the coil vibrators should be brightened and adjusted and the battery should be packed so there is no possibility of the cells shifting.

Some Reflections on Automobile Touring.

By G. M. B.

In making a few remarks on road touring the writer aims to prove from his experiences the practical value of the automobile as a traveling machine. Every day in any of our cities one can walk down a fine asphalt or macadam avenue and see any number of self propelled vehicles running up and down the street, the occupants seeming to be perfectly satisfied with themselves and believing that they are enjoying the sport of automobiling to the fullest degree. The class to which I refer remain within a radius not exceeding 10 miles from home and cover the same beat almost daily as long as the weather is favorable. On all the cars of this class you will find an odometer, and it is really surprising to find how many miles can be covered in this way. And yet, as far as real experience goes, or the enjoyment of automobiling as a sport, this counts for absolutely nothing.

For real sport there must be some hazard, or at least some keen excitement. One can more fully appreciate the mechanical perfection of his car by enduring a ride when something is wrong, and the righting of that wrong and return to perfection I can only liken to the pleasure experienced by the sudden passing away of some severe physical pain.

Three seasons ago the writer received his first car, and within two days he demonstrated to his entire satisfaction that the automobile was a dismal failure, and only awaited the arrival of a man from the factory to have the dire satisfaction of showing him what a complete failure his creation was. I knew it all; hadn't I studied up the little book of instructions till I knew it by heart, and besides I was one of the mechanically inclined.

He came, and in ten minutes I knew that all the fools were not dead yet and that I was one of those that had escaped.

Fortunate indeed is the man with a little patience who gets his hard knocks right at the start. He learns. He acquires confidence, and it is only with confidence that he can come to the full enjoyment of his car. To him a 500 or 1,000 mile trip is a pleasure, and the thought that something will come up to test his knowledge of the car is what renders touring so fascinating.

While I have not traveled an immense number of miles, I doubt if any amateur has done much more in the way of touring than myself. In fact, that has been the only way that I have used my cars. And what I say may help some who desire to become tourists. Don't believe too much in luck. Broken chains, tire troubles and many of those ills have less to do with luck than many make themselves believe. Watch out for all sudden strains and favor your car somewhat as you would a good horse, and you may be rewarded by good service. I have usually found that it was

when I started out to make record time on a run that I had the most trouble and it took the longest.

I have always made it a rule to yield the road to anyone with a machine I believed faster than mine, or still more willingly to a driver I considered more reckless. If there is any one thing that brings automobiles into disrepute more than another it is to see a car driven down the main street of a city at a 20 mile gait with a constant toot, toot, and depending on sudden brake applications to slow up with hairbreadth escapes. When we come right down to it, some of the caricatures of automobiles running amuck are not so far from the truth. It is the use of judgment that makes the car reliable and keeps down the repair bill. It may seem like boasting, but never but once have I failed to reach the place for which I set out from inability of the car to get me there. And this was a case where a sign to the wise was not sufficient. I had been on a two weeks' tour through the New Hampshire and Vermont mountains, and had noticed that one of my bearings on the rear axle warmed a little more than usual, but I put off investigation to a more convenient season, which resulted in a decidedly hot article in the way of bearings. Drilling a new oil hole through the other casing and a liberal application of graphite and oil put the car in shape to make the run home, 60 miles, under its own power, where I replaced the axle, which was badly scored.

I have just returned from a little trip of 900 miles in nine days, with a party of five in my car, and the entire expenses of that trip would not have paid the railroad fares for the party over the same route, much less the hotel bills, and I doubt if it could have been covered in less time by rail, with a visit to all the places covered. This certainly is a practical experience and contradicts the views of most people who regard automobiling as an expensive mode of traveling. I may here say that I did have one little experience which temporarily caused some agony, but afterward proved a pleasant spot in the trip, and shows up the opposite to most experiences exploited in your columns. Most tourists know that there are certain towns of such aesthetic taste that they have to build Gothic crosswalks in the main streets. This is frequently done by using a keystone of flag and building up with cobbles. A more modern way is to use concrete, which allows of a truer arc of a circle being obtained, I believe. This gives a decided cam motion, with a very positive action to those that cross it. I drove into a prominent New Hampshire city, whose streets were fully equipped in this manner, and before I landed my party at the hotel I had succeeded in cracking both of my front springs. I had visions of a good long lay-over while waiting for new springs from the factory, when I was told that I ought to have remembered that right here was the home of the oldest

heavy coach builders in the country. Here I was treated with the greatest courtesy, and had a set of springs turned out to fit by the best spring makers in the country, and was only delayed three hours on the deal. Better still, the price charged for the job was about one-third what I had considered it to be worth. This I may truly call luck—that in a trip of that distance I had broken my springs in the only town passed through which had a fully equipped spring making plant.

I have had a number of little troubles on the road that, of course, have caused a little annoyance—have frightened a few horses, run over a few hens and dogs, and had my share of amusing situations—but taken as a whole they are about the same as falls to the lot of the tourist in general.

There are two points which I desire to call attention to that might be called "lessons of the road." First, it has gotten to be a mistaken courtesy for everyone running an automobile to stop when he sees another machine pulled up by the road. If I see a man who may desire help, I am only too glad to stop, but it has got to be a decided nuisance every time you stop a 25 horse power touring car to oil up to have every little steam car stop and offer assistance. A short time ago I had out a party and we stopped for lunch close to a pleasant pine grove. We had hardly got out when a steamer pulled up offering assistance. I replied that if they were really hungry I should be glad to have their company. Automobiles are not the curiosity that they once were, and it is to be assumed that a man who travels knows his machine, and if it is a case of needing assistance he will make some sign to that effect. I really believe the majority of drivers consider it annoying to have this stop to them at every petty stop they make. You can usually tell from a man's expression the depth of trouble he is in, and this should be the guide, rather than the simple fact that a car is stopped.

My last lesson is a caution for the tourist to draw his stories within reason. Remember that an average of from 20 to 25 miles an hour is about all the very best of the touring cars will make over our roads, and you will not gain respect by entering a station and telling a group of chauffeurs that you have done 100 miles in two or three hours, or something to that effect. You may believe yourself you have done it, but forget it and make another calculation.

President Shattuck, of the A. C. A., writes from Marienbad, Austria, under date of August 6, that he has completed a tour of 3,500 miles through Southern France and Switzerland in a 16 horse power Panhard car. This is not the first automobile tour in Europe undertaken by Mr. Shattuck, for in 1900 he traveled extensively in France and Switzerland with J. Dunlar Wright, of the A. C. A.

The Social Status of the Chauffeur.

By A. B. TUCKER.

Among the multitude of problems which are facing the automobile trade and sport there is perhaps none which is more perplexing than the proper estimate of the chauffeur as a class. He is at present far from being a fixed quantity. As an element in automobile life he is looked upon with varying degrees of importance. His exact position is less firmly fixed in the public mind now than it ever has been.

This is true in every respect, from the spelling of his name to his commercial or social status. In fact, it is to some extent an open question whether good taste should dictate that he be called a "chauffeur." There are those who think that the good old Anglo-Saxon language is sufficient in automobiling as it is in other sports, and that the word "driver" or "operator" is good enough for the man at the wheel of the touring car. But the French term has obtained such a wide usage that it is reasonable to suppose that it will continue as an integral part of the phraseology of automobilism.

But granting that it is correct to call him a chauffeur, it ought to be logical that there should be one way of spelling the term. In reality there are many variants. The word is spelled, like Sam Weller's name, "according to the taste of the speller." Thus we have "chauffeur," "chaufeur" and "chafeur," none of which is correct, but all of which have occurred in what would otherwise be above criticism as automobile literature.

After all, the spelling of the word is the least troublesome problem. The position of the man is one which very few understand. Is he a servant? Hardly—or at least he would resent being called one. Is he a companion? Sometimes a democratic, whole hearted automobile owner will accept him as such, but more generally he draws a social line which is more or less distinct, according to his views of caste.

Of course, a great deal depends upon the kind of man who engages himself as a chauffeur. His own estimate of himself, the air with which he carries himself, the tact or diplomacy which he shows in dodging situations where his social standing might puzzle others, the manner in which he goes about his own business, his address and his dress—all these things incline one to the belief that the chauffeur is pretty largely what he decides he ought to be.

At least this is true at present; what it will be in the future is a question which the most astute seer can hardly expect to answer. It is clear that there is considerable difference between the chauffeur of Europe and his American brother. In touring countries on the other side of the Atlantic a well defined class has existed for years, known as "coursiers." Every traveled person knows what a "coursier" is, and yet it would be very difficult for even an experienced globe trotter to define his

exact position. He is perhaps a peripatetic major domo. His position is in some degree analogous to that of the housekeeper or the dressmaker in the female menage. But if it be difficult to define what a coursier is, nearly everyone knows what is expected of him, and the same may be true of the chauffeur.

In America, there being no precedent for him to follow, the chauffeur has had to take the situation as he found it. The recent formation of associations of chauffeurs would seem to indicate that he is touched with the bacillus of labor unionism. Perhaps some sort of a stand along these lines will tend to give a better basis for estimating the chauffeur as a class.

It is not at all certain but that a mistake is made in classing all chauffeurs together. They come from many different classes of society and their rank is legion. There is a vast difference between the handy machinist or the electrician who has taken up motor car driving because of his technical skill and the field which opens before him and the dapper, neatly dressed Frenchman, for instance, who has been imported to pilot the car of my lady of quality as she wends her way to make her fashionable calls in the afternoon.

Then it must be remembered that many men of excellent family have taken up the driving of cars because of their reduced circumstances, or from other reasons. It is known that during the present summer season a considerable number of the undergraduates from prominent colleges working their way through their universities have, instead of clerking at some hotel or waiting in the dining room thereof, undertaken the work of speeding the touring car, thereby gaining much of health and exercise while laying up a store of cash to pay their expenses during the coming year.

These men are of a class who never would have consented for any reward to drive the coach horses of any man. At the first glance it is a little difficult to see the difference between the coachman and the chauffeur, but an analysis of the situation shows that there is at least one great difference—the technical knowledge required to drive a car is of a much higher grade than that needed to officiate as a coachman.

Taking into consideration such phenomena as the college man behind the steering wheel, it is evident, therefore, that there are chauffeurs and chauffeurs. We must not assume that the course of conduct which is pursued toward one would be the proper line of action used in controlling the other.

The situation demands careful handling. The matter of hotel accommodations to be provided for the chauffeur is one for which no rule has been fixed. The automobilist must provide for the chauffeur according to his estimate of what the chauffeur is, and that is the whole story.

The future of the chauffeur as a class is an unknown quantity. It is probable that

the tendency will be to fix his remuneration at a point which will tend to fix his social status. At present it depends altogether upon the financial standing of the employer what the chauffeur gets for his services. In the future it is likely that the money question will be a fixed quantity, or at least dependent only on the ability of the man. Of course, experience, knowledge of mechanical detail and general handiness will continue to demand a considerable figure. But probably not nearly as much difference will be noticed between the high grade chauffeur of the future and the ordinary one, as is the case today.

The status of the chauffeur is further complicated at present by the place which he occupies in fiction and on the stage. Nine-tenths of the fiction which has been written on automobiling throws a romantic glamor about the person of a chauffeur. He is either a lord in disguise or a gentleman athlete under a cloud or something of that sort, and the always beautiful young lady whom he drives invariably falls in love with him. There is no doubt that this has its effect on the more or less impressionable public. It is safe to say that the ordinary man, as he looks at an automobile passing him in the street, gives one glance to the automobile and three to the chauffeur. What the ordinary woman does the writer, a mere man, cannot say.

There are evidences also that many a chauffeur knows the place which his class occupies in fiction and takes advantage of it to its fullest extent.

Although to the practical man these latter observations may seem of little value there is no doubt they have their place in a proper consideration of the question.

The Great Western Railway Company, of England, have decided to establish road motor car services as feeders to the railway in country districts. These vehicles will furnish links with the railway between the stations and outlying villages and small towns.



OLD MEXICAN RUINS.
ATTACKING A SAND HILL.

ROAD LEADING BY CHAPULTEPEC GROUNDS, MEXICO CITY.

Winter Resorts for the Automobilitist.

During the winter months automobile touring is impossible in the Northern States, at least as a means of pleasure and recreation, and at that season the thoughts of the enthusiast not detained by business considerations turn to Southern lands, to the famous winter resorts on the shores of both the Pacific and the Atlantic. The American automobilitist has this advantage over his European colleague, that he can find at any time of the year within his own country a place where touring is seasonable. European enthusiasts sometimes cross the Mediterranean during the winter months and explore the interior of Tunis and Tripoli, where fine roads are said to abound, but these places are relatively less accessible to the automobilitists of the large European cities than are the Florida and Georgia winter resorts, or even Cuba, to residents of New York, Philadelphia and Boston. And for this reason, while excursions of automobilitists to North Africa are still relatively rare, nearly all the American winter resorts had a regular automobile colony last season.

SOUTHERN CALIFORNIA.

Southern California would undoubtedly take first place as a winter resort for automobilitists if it were not for its great distance from the centres of automobilism. Its healthful, semi-tropical climate; its generally excellent roads, its exuberant vegetation, its historically interesting ruins and the splendor of its scenery make it an almost ideal touring country. And even the drawback of its great distance has not prevented automobilitists from the large cities of the East flocking there in large numbers the last few seasons. Every veteran tourist has a natural desire for the experience of a drive through a palm lined avenue, over a dustless, oiled road surface or over a straw road, and all these various experiences may be had in Southern California. Moreover, the points of interest in this part of the country, owing to lack of proper railroad facilities and other means of communication, can be visited conveniently only by means of an automobile.

The general excellence of the roads has also led to a considerable development of automobilism among the natives in this section, and in consequence storage and



AVENIDA DEL BOSQUE AND CHAPULTEPEC CASTLE, MEXICO CITY.



THE MONTGOMERY ROAD NEAR SAVANNAH.

repair facilities in the larger cities—Los Angeles, Pasadena, Santa Barbara, etc.—are quite satisfactory. Most of the lead-



SAVANNAH YACHT CLUB.

ing manufacturers have agents in Southern California, or at least in San Francisco, and any repair parts needed can therefore

generally be obtained after a short delay. Some idea of the importance of Southern California as a winter resort for automobilists may be gained from the fact that at Pasadena last season an automobile club was organized composed solely of Easterners, which reached a considerable membership. Club runs were arranged to various points of interest and some creditable work was done in the interest of good roads.

Those who are particularly interested in this section as a touring ground are referred to articles in the following issues of *THE HORSELESS AGE* for descriptions of tours in that region: March 5, 1902; June 18, 1902; January 7, 1903; January 21, 1903, and January 28, 1903.

MEXICO.

To those who want to go beyond the boundaries of the United States, the vicinity of Mexico City offers many induc-

ements, short trips to nearby points of historical interest being among the most enjoyable possibilities in that part.

Probably from no other city on the continent can one reach in so short a time so many places of historical and legendary interest, and with but very few exceptions the roads to these points offer views of mountains and valleys that are unsurpassed, the many ancient and quaint buildings to be seen along the route adding greatly to the picturesqueness of the views. To one appreciating the beauties of nature and architecture these trips are fraught with constant wonder and enjoyment.

It is not to be expected that the suburban roads in Mexico are equal to those in the United States for automobile touring, but excepting the latter part of the rainy season (August and September) the roads will generally be found in good condition, and in many localities there are stretches of miles of level and smooth traveling.

In the immediate vicinity of Mexico City the rainy season does not interfere with short rides, as it is a rare exception to have a rainfall in the morning, and even though it may have rained the previous afternoon and night, the roads from the city to most suburban points will be found in excellent condition for a drive the following morning.

The favorite route for short automobile rides from the city is over the Paseo de la Reforma, through the grounds of Chapultepec, the President's summer residence, then taking the fine level road leading through Tacubaya, San Pedro, Mixcoac and San Angel. This road passes through the links of the San Pedro and Mixcoac Golf clubs.

For longer trips machines will be required capable of standing rough and mountainous roads, for, Mexico City being situated in a valley, one must of necessity climb up in order to get out. The nature



ROAD THROUGH SAN PEDRO GOLF LINKS IN MEXICO CITY.

of these climbs is illustrated in one of the photos herewith.

A fine road from the city to Celaya, State of Guanajuato, about 400 kilometres in length, is now in course of construction, and will be finished at an early date. This road passes over mountains and through valleys magnificent in grandeur and beauty, and leads the tourist to many stopping places of historical interest, besides making an excellent outlet from the valley of Mexico.

SAVANNAH.

While most Southern cities have abominable pavements and a vicinity with poor roads, Savannah, Ga., forms a happy exception, as a number of photos herewith indicate. Savannah is most easily accessible from all Northern points either by rail or steamer; it has fine hotel accommodations and the weather is never too cold for driving. Repair facilities are all that is required, and the roads within a radius of 10 miles from the city are said to be as good as anywhere in the world. Savannah's reputation as a winter resort is rapidly growing. During the last winter at least two prominent New Yorkers, automobilists and yachtsmen, purchased winter homes there on one of the salt water inlets, 12 miles from the city, this point being connected with the city by a road the surface of which is almost as hard as concrete. It is understood that the parties referred to will also take their yachts down to Savannah, which will place them in position to enjoy the convenience of a yacht at their front door and an auto in the stable. The county in which Savannah is located is said to have no less than 100 miles of well paved roads.

Automobilism is also making rapid headway among the local population, and cars of various types and motive powers may be seen skimming over the smooth asphalt boulevards in large numbers. Perhaps the first Northern automobilist to take a car to Savannah was Mr. Baxter, of Brunswick, Me., who two years ago



A TEN MILE STRAIGHTAWAY ON A SAVANNAH ROAD.

made a trip there upon the recommendation of F. C. Battey, a local automobile enthusiast. Since then Mr. Baxter's example has been followed by many others.

FLORIDA.

Being almost entirely devoid of good roads, the only inducements that Florida offers to automobilists are her magnificent beaches. The Ormond beach and the Daytona beach have a national reputation, and during the height of the season these beaches present a most animated and picturesque scene, with their variegated pleasure traffic (mostly horseless) and their crowds of pleasure seekers. The Daytona beach is 25 miles in length, and the suitability of its surface for automobilism may be judged from the fact that last

winter an automobile race was held there in which at least one machine of the heaviest class participated. These races are to be repeated the coming winter. Readers



"WHERE THE SALT BREEZES BLOW"—SAVANNAH.

who may wish further particulars regarding these beaches are referred to THE HORSELESS AGE of December 26, 1900, and February 4, 1903.



NEAR THE MIXCOAC ROAD IN MEXICO CITY.

CUBA.

The list of localities where the American automobilist may comfortably spend a part of the winter and enjoy the use of his machine closes with Cuba—the Pearl of the Antilles. The city of Havana affords every accommodation in the way of hotels and repair shops, and its surroundings are traversed by well kept highways. Since the Spanish-American War patriotic Americans are more than ever interested in Cuba, and the combined historical and scenic attractions will undoubtedly draw many machines across the water to the shores of the young sister republic during the next few years. Some notes on the conditions of automobile touring in Cuba may be found in *THE HORSELESS AGE* of January 21, 1903, and July 22, 1903.

The Automobile Tourist's Hotel.

By C. H. GILLETTE.

Strictly speaking, there is no ideal hotel for the automobilist. We doubt if there ever will be one except at the end of the macadam boulevard which runs to the Pearly Gates. We have interviewed tourists of all classes and temperaments, from the man whose aim is to pass every other car on the road, to the quiet, easy going, stop-a-day-and-go-fishing person of leisure, and, though some of these myriads are patient men and easily satisfied, no one has admitted that he has found the real thing in a hotel.

Sometimes the hostility under discussion fell just short of being perfect, but in the long run, when all the criticisms were in, it was found to be lacking in some important particular. If nothing else was wrong with it, it wasn't situated just the right distance from somewhere, and therefore was not always convenient on all runs.

THE "IDEAL" HOTEL.

As near as can be determined, the right kind of an automobile hotel should have only rooms with baths, a kitchen the equal of Delmonico's and a thoroughly well selected wine cellar. It should have wide piazzas and a grand view in at least four directions. It should be in a park of forty acres or more, the approaches to it being by way of blue shell roads winding between rustic summer houses, babbling brooks and flower beds. Yet it should not be in the centre of the park, but nearer the highway. On each of its four sides there should be a porte cochère and a bell boy on guard to welcome incoming parties. The garage should be at least 100 feet square and should house a force of mechanics and experienced workmen, in number about twenty-five. They should take charge of the automobile on arrival, relieving the chauffeur of all responsibility and delivering the automobile to its owner in the morning in first class condition, together with a certificate to the effect that the machine had been thoroughly inspected and cleaned, the tanks filled, oil applied and the entire affair guar-

anteed to run for twelve hours without further examination.

Upon being shown to a room, the leader of the party would be waited upon by the "itinerary clerk," who would go to work laying out the program for the next day, if necessary sitting up all night to be ready for the guests' departure in the morning. During the evening the band would play "Merrily We Roll Along" or "Speed the Plough" or other suggestive melodies, while the happy guests danced or ate terrapin or consumed highballs with no thought of the cares of the morrow.

After a refreshing night of sleep the tourists would find the car at the door, and the clerk would hand him a bill for \$2.25, or with drinks, \$2.35.

We know of no such place.

WHAT IS ACTUALLY REQUIRED.

The actual conditions with regard to the automobilist's hotel are different. But while they fall short of complete satisfaction, they open up a field for analytic speculation which has not its equal in any line of endeavor. The tourist never knows whether he is going to strike a really good hotel or whether he will have to back his car into a shed alongside a self binding harvester and eat "fried steak-en-spider" and apple-of-Sodom pie. Nor does the showing made by the host, in his printed advertisements, seem to have any bearing on the case. "Accommodations for automobiles" may mean anything from an open shed to a cyclone cellar, and the hotel proper may or may not be worth the name.

There is a compensation, however, in striking the combination at unexpected times and places, and under conditions which are often the most forbidding. The law of the road is: Look out for a good hotel where you think it cannot possibly exist. They crop up generally when one has grown utterly discouraged over the situation and scarcely hopes to see anything approaching home comforts until the home is reached.

For instance, during the whole course of a week's tour in a car last summer it was not until the seventh day that our party, utterly disgusted with the unvaried lack of accommodations had along the road, stumbled upon a hotel—a real hotel—in an unheard of place. We were within an hour's run of our destination, but so delighted were we that we put up at this hotel for more than a week, and never for a moment considered going on to our original destination. With this place as a base we made some delightful short day runs, information regarding distances, points of interest, and qualities of roads being given us by the host.

Not that this hotel was ideal in any respect. We could get gasoline and any amount of oil for our engine. The engineer of the hotel was a machinist to boot. He knew somewhat of gas engines, and with the aid of common sense and a few technical books on automobile construction which he had obtained he was able to

take care of all our repairs and adjustments at the reasonable charge of 50 cents an hour.

The garage wasn't much. But it served the purpose. It was once a barn, but it didn't leak when the rain fell. In it were two machines besides ours belonging to other hotel Columbuses.

It must in justice be admitted that a great many progressive American hotel owners have begun to awaken to the value of having really good accommodations for the road touring class. Experience has proven to these men that automobilists are liberal and are not, as a class, fault finders. On the main routes many of the old fashioned inns have been refitted, and this year there have been a number of new modern hotels erected with due regard to the needs of automobilists. In the aggregate this does not entail extraordinary expenditure. There is storage room to be considered. But this need be only a dry, clean structure with floor space ample enough to accommodate a reasonable number of machines and room to move them in, out and about.

STOCK OF SUPPLIES AND REPAIR FACILITIES.

There should be kept on hand enough tools and a few spare parts of standardized calibre, so that ordinary repairs may be attended to. A competent mechanic for this work is a necessity. Wherever there is a power plant for pumping or for elevators an engineer is, of course, provided. To pay a little more for a man who is also a handy mechanical worker, who understands automobiles, means money in the proprietor's pocket. If there is no pumping or power plant, an arrangement can often be made with some nearby repair station, by means of which the services of a competent machinist may be had on demand. Gasoline is a necessity. No hotel which attempts to attract the automobile trade can afford to be without gasoline. The handling of it is not so difficult a problem as many suppose.

But gasoline is not the only thing which the hotel garage should boast. A supply of clean water should be at hand, together with a complement of funnels and measures for handling it. A few batteries for ready use would not be a bad investment. Of course the expenditure for spare parts and repair materials should be dependent on the amount of business likely to come to the hotel.

KNOWLEDGE OF SURROUNDINGS ESSENTIAL.

The most available asset for the hotel man, however, is a knowledge of the road situation and the points of scenic and historic interest in the neighborhood. If he is uninformed in these matters it will be worth his while to gather data by inquiry or by annexing some "oldest inhabitant" whose knowledge can be placed on tap when necessary. To know of a few circular touring routes in his vicinity or of points to visit which and return will take from three to eight hours often means

the gentle and kindly retention of his guests for days beyond their intended stay. All this means a golden harvest when the final reckoning comes.

If we kept a hotel we should draw such glowing word pictures of our native heath that we should charm our visitors into staying at our good inn for many a long, costly day—that is, we would try it.

Hotel facilities for the accommodation of automobiles should be commensurate with the prominence of the hotel. The big hotel with more than local reputation for accommodations other than automobiles should have a first class garage with facilities for any repairs. The size and fame of a hotel presuppose equal accommodations for automobiles, that is, if the management seeks this patronage.

SHINING EXAMPLES.

As shining examples of this there are several hosteries near New York city which we have in mind. One in particular has an electric charging plant for electric; a commodious garage with an expert repairer and one or two assistants; a supply of standard parts, gasoline and lubricants. Moreover, this hotel gives to its automobile guests a little roadway guide and map outlining routes to various points of interest or through an attractive territory. The host, moreover, is always ready to lay bare his mind of its store of information regarding automobile touring.

The small hotel—the one which the tourist happens upon, rather than seeks—need not go to much expense. The most that the management could expect would be stops by the automobilist of a day or two. But gasoline, oils, water, a barn for storage and an agreement with a nearby machinist (the agreement to include a set charge of so much per hour for labor) will help mightily to keep the chance guest happy. While the same kind of facilities are expected of the small hotel they are not expected in the same degree.

ACCOMMODATIONS AT RESORTS.

As against the regular hotel, there is the summer or winter resort which must hereafter reckon with automobilists. This resort depends not upon the transient guest, but upon those who stay anywhere from a week to a whole season. The automobilist would be fruitful soil for a hotel management's cultivation. Besides himself and his car, he has with him either several friends or his family, not to speak of the chauffeur. He never goes anywhere alone. Much is demanded from this class of guest from this class of hotel. The best is not too good. The return is always commensurate with the outlay for facilities. Of course, only the best resort could expect to do direct business in the way of automobile guests. The little fellow can do nothing better than to care for the transient, but he should be prepared accordingly.

Then, again, it is an egregious error on the part of the larger resort's management to figure that because the building is situ-

ated in a mountainous region there is no use bidding for the automobilist's patronage. If the grades do not run over 12 to 15 per cent., the average touring car will take them with ease. It is a matter of boast on the part of the manufacturers of automobiles that their cars can climb hills of such and such grade at a certain speed. The hill climbing contests held from time to time by the clubs, are to demonstrate the abilities of cars in this particular. The average automobile owner feels great pride in his car if it takes hills easily, and once successful will constantly strive to repeat the trick.

SOUTHERN RESORTS.

There is great opportunity thrust upon the managements of winter resorts, particularly along the east and west coasts of Florida and in other districts where the roads are of good material and the conditions are suitable. The coming winter will see more automobiles in the South than ever before. The persons who spend a part or whole of the winter there are perforce the ones who own automobiles. Reasonable encouragement being offered by these hotels in the way of increasing the facilities to take in automobiles will be met with an instant influx of cars of all descriptions.

In short, hotels of nearly every description will make a mistake if they overlook the automobilist. The time will soon come when in writing for information about a hotel for a week's or season's stay the writer will also ask, "What are your facilities with regard to caring for automobiles?"

Hotels along the well beaten touring routes should have a weather eye for opportunities. Signs on the roadside informing the automobilist of the hotel he is about to reach are important; they are, indeed, practically a necessity.

IMPORTANCE OF AUTO TRAVEL.

Automobilists are in a class which is constantly growing. The fact that manufacturers are overworked and in most cases cannot make delivery until next spring should be a broad hint to hotels which desire the patronage of automobilists. Within the next few years the number of people owning cars will be multiplied many times. There are now about 30,000 owners of cars. If this number be multiplied by five (a conservative estimate) the result will be near the number of people who may be considered as possibilities. The conclusion is obvious.

The automobilist is worth recognition in hotel advertising. He is a liberal spender, because he is a pleasure lover. The average man will spend money for his food with a light heart. The golfer, the cyclist, the hunter, the fisherman, the tennis enthusiast, are counted upon by hotel advertisers. Why not automobilists?

We have said that automobile tourists are not faultfinders, and we think this is a virtue which might well be emphasized.

That there is not more complaint of hotels speaks well for the good nature of the touring class. Indeed, whether it be on account of innate good nature or because of the influence of life in the open, they seem to ask for little in the way of splendor and magnificence. Given a fair degree of hospitality, a place for the car and the necessary attention to it, a comfortable bed and well cooked meals, and the average tourist is well satisfied. We speak now of the tourist who is in the game for all there is of worth in it—not the scorcher who runs out of the city in the morning and back at night. There is a gratifying increase in the former class from day to day.

TOURS TO WORLD'S FAIR.

This is a subject which ought to engage the attention of hotelkeepers pretty fully during the coming year. Added to the constantly increasing number of those to whom touring appeals as a warm weather pastime, will be an unusually large number of long distance tourists next year on their way to and from the St. Louis Exposition. The many club runs which have been laid out and are being laid out and the numerous individual announcements for the World's Fair period make it certain that there will be thousands of automobiles on the roads leading toward St. Louis from all directions, from May to October. Multiply the number of automobiles by three (the average number of the party in the cars) and Mr. Hotelkeeper has a by no means inconsequential army of prospective guests, whose comfort and entertainment he has to consider. It is not too early for him to grapple with the problem and if he is wise he will consider it this fall.

Since the days of coaching no phase of American life has given promise of helping the rural or small town hotelkeeper so much as automobile touring. The manufacturers, the clubs, the trade press and the enthusiasts have done all they can possibly be asked to do to stimulate the sport. It has been a power in developing interest in good roads and in opening up country which has been lost to the tourist for fifty years. Only one link in the chain needs to be forged—it is the attention and interest of the progressive hotel proprietor.

Process for Softening Castings.

Hard iron castings may be softened by the following process, according to the *Deutsche Schlessen Zeitung*. The entire casting is brought to a red heat and then slowly cooled while covered with carbon dust. If the castings to be softened are small, a number of them are packed into a crucible and materials are added which at red heat give off carbon to the iron. The crucible is carefully closed and is gradually heated and kept for a couple of hours in a furnace or an open fire, and then also slowly cooled. Suitable materials for supplying the carbon are cast iron lathe chips, soda or raw sugar. If sugar is used, it should be added in considerable quantity.

Accounts of Tours.



A Vacation Trip Through the Eastern Adirondacks.

By A. H. CHADBOERNE.

My wife and I decided that we would invite some friends to accompany us this summer in our gasoline touring car on a trip through a portion of the State of Maine, returning through New Hampshire, the Berkshire Hills, in Massachusetts, and down the Hudson.

Our party consists of my wife and son; Miss L. Miller, who keeps the maps and daily log book and supplies valuable information as to which corner to take when on new or strange roads; and Mr. Leonard Atwood, who acts as horse tamer, when required, and at other times steps out to inquire the way from some roadside cottage.

This jovial crowd, together with our French bulldog, Marquis II, as mascot, and



MR. ATWOOD INQUIRING THE ROAD.

the writer as chauffeur, mechanic and man of all work, made up the party that left Overbrook, Pa., the last of June, bound for Portland, Me.

While we had our share of troubles, I will not take time now to write up the run from Philadelphia to Boston, as that run has been taken so often that there is little of novelty in it; but I hope that the return trip through the Berkshire Hills and down the Hudson will provide scenery and enjoyment worthy of notice.

We started from home with the expectation of being gone several weeks, and with the determination to enjoy ourselves, come what would—never to be in a hurry and to stop and put up when and wherever we felt inclined. In other words, we never had any special point to reach, but started in the morning when we felt inclined and took lunch by the roadside or in a hotel, as circumstances or our feelings dictated. This, I believe, is the only way to tour in a motor car and thoroughly enjoy every day. There can never be any disappointment about reaching a certain point at a given day, because we are touring for the pleas-

ure of seeing the country and being out in the open air.

TOURING EQUIPMENT.

I carry one extra rear spring, one extra shoe and four extra inner tubes, and in a box on the right hand step 3 gallons of lubricating oil. Our baggage was all sent ahead, except necessary articles of dress, which were packed in rubber bags and stored under the seats of the tonneau. The women in the party wear a thin white imported rubber gossamer, silk lined, very light, but dust and water proof.

The silk canopy shown in the photograph is portable, and can be taken off and put into a basket. However, we keep it up all the time. It is of my own design and was made in a hurry before leaving. It weighs less than 15 pounds, is sunproof and a great protection in a hard rain.

We spent a few days near Boston, and left there about 2 o'clock one afternoon for North Berwick, Me., where we were to spend a few days on the old farm with my sister. We ran out over the bridge on Massachusetts avenue, through Cambridge, Somerville, Malden, Lynn, and through Salem (the home of the witches) over good roads to Portsmouth.

We lost some little time picking our way, until we reached Lynn, and after we neared Portsmouth we struck a poor piece of road and a "thank-you-marm" nearly 2 feet high. I caught sight of it in time to shut off the power and apply all brakes, but the ensuing jolt was decidedly uncomfortable, and resulted in a broken battery wire.

GASOLINE DIFFICULT TO GET.

For some reason I could not find the break, but at last it was discovered and quickly repaired, and we ran on, arriving in Portsmouth at 6 o'clock. As I did not feel certain about getting gasoline at the country town I was headed for, I decided to refill at Portsmouth, but was informed that gasoline could not be purchased after 6 o'clock, as all places selling it were closed. While talking the situation over a bystander volunteered the information that there was a small dealer, Mr. Kehoe, a few squares away; so I ran down there, but the proprietor was not to be found, although a woman came to the door and told me she saw us coming and had sent to the corner for him, but he was not there.

There were several 5 gallon cans in the yard, and I asked her if she could not sell me some; but she replied that she did not dare to, as Mr. Kehoe sold all kinds of oil, and the last time she supplied an automobilist she had filled his tank with kerosene by mistake, and that the owner returned on foot in a few minutes, and seemed very angry. I assured her I would select the right can and be responsible, so she allowed me to leave a dollar with her and depart with 5 gallons more of the 74 degrees quality that gave me a full tank.

We stopped at the Rockingham for supper, and it was after 8 o'clock and dark and cloudy when we had finished a most satis-

factory meal. Our party voted to go on 30 miles to our destination, and as I was anxious to give my new searchlight a fair test on a real dark night. I was glad to push on.

We left the hotel with two side oil lights, one acetylene headlight, and the 9 inch searchlight on the dash.

THE DELIGHTS OF NIGHT TRAVEL.

That ride, after we got out of town, over unknown roads along the coast to Wells village and to miles inland to North Berwick, was one of the most enjoyable rides we have had so far.

My headlight was of little use, but the searchlight was most satisfactory, and made our roadway stand out as clear cut and well defined as one could wish. The roads were very good, but the prettiest ride was after we left Ogunquit and turned west over a narrow roadway, where there was hardly a house anywhere for nearly to miles. On either side of the narrow roadway the bushes and young growth were so near as to almost brush the hubs, and the sky was so black that as we glided along with the searchlight thrown ahead it looked as



OLD BLOCK HOUSE, ERECTED IN 1754.

though we were plunging through a long green tunnel, the cold, damp air in the hollows only adding to the effect. This was soon over, however, and we were on higher ground and wider roads, and a stray light could be seen here and there as we neared the village.

After a few days' visit we left one afternoon and ran on to Portland, Me., where we spent the night at the new Lafayette Hotel. I found out that evening that we could be taken care of for a few days at Poland Spring, so we decided to run up there the following day and spend Sunday. This was July 1, and we had two weeks to put in before returning to Poland Spring August 1 for a longer stay, as we had planned.

When we left Portland the sun was shining, but a few clouds in the west threatened rain. We found the roads sandy, but fairly good, and made very good time. Before we reached Gray Village, however, the shower overtook us, and we had our first opportunity to test the waterproof qualities of our silk canopy top and rubber coats.

The roads were so sandy that the shower,

hard as it was, did not affect our speed, and we soon ran into clear weather again."

A SKIDDING EXPERIENCE.

The roads, as I have said, were so sandy that I felt no danger from the shower, when all of a sudden we came to a short and rather steep hill. As we approached the top I had my car under the usual control, and it was well I had, for as I glanced down the hill I saw the glistening of water on clay—not sand—and suddenly found my car skimming about like a boat without a rudder. There was nothing to do but try to keep her headed straight and take our punishment. It was only a second, and we slewed toward one side and then brought up in the left hand ditch with a bump and a bang, got out again, and kept on, half sideways, down to the sandy bottom, where I applied the brakes and brought the car to rest with the engine silent. No one was injured, except possibly by a little nervous shock.

Nothing but the very moderate speed at which we were running as we approached the decline saved us from serious accident, because the roads had been so deep with sand for miles that the possibility of striking clay never came to my mind.

I afterward learned that this clay hill was known by everyone, and many a horse had gone down on its slippery surface. The lesson is obvious—never approach a hill on an unknown road at more than to miles an hour, and have your car under perfect control; you can't tell what the conditions may be ahead. And, further, if you tour through Maine, remember, no matter how sandy the level places may be, nearly every hill is blue clay; and while it makes a good bottom in dry weather, a little rain will make it so dangerous that only the greatest care will prevent serious accident.

When I found no harm had been done by the severe shaking up we had had, I got out to ascertain the cause of my engine stopping, and found that the batteries, which are carried in a box under the tonneau floor, had jumped up so far as to knock the top off the box and shear off the battery wire where it entered the side of the box.

This was soon repaired, and we started

up the next hill ahead of us, toward Gray, and then had an example of skidding up hill. However, we got up, crablike, sideways, or any old way, until the top was reached, and then went on without further mishap to Poland Spring—one of the most beautiful spots in the country.

A few rainy days were put in by a side trip by rail to Bemis, and on our return we started for a trip further east and

UP THE ANDROSCOGGIN VALLEY.

We had promised our horse tamer, Mr. Atwood—who up to that time had had nothing to do—that we would spend the following Sunday at his old home in Farmington Falls, on the Sandy River. We ran over to Auburn and found the roads very sandy. We took dinner at the Elm House, and here were interviewed for the first time by a local reporter, who assured us that our car was the first touring car ever seen there.

However, we had not been there more than half an hour when another gasoline touring car, followed by a steam car, came up and divided with us the interest of the crowd. This party had been touring through the White Mountains and were just returning to Brunswick.

As soon as we had filled the tanks, we started up the west bank of the Androscoggin, and I would advise anyone going to Maine to be sure to take this trip. The roads were very good and the scenery superb. I am sorry my little kodak can give only a poor idea of the various beautiful views as we followed the river to Livermore Falls, where we crossed and proceeded northeast over the Ridge Road to Farmington Falls.

The next day (Sunday) was clear and cool, with a high wind, and we only took one short trip, to the top of Cape Cod Hill, from which we obtained a panoramic view of the hills and mountains about the Rangeley Lakes.

We thought Cape Cod Hill (so named because originally settled by people from



SPENDING SUNDAY AT FARMINGTON FALLS.

Cape Cod, Mass.) something of a hill, but we little knew the hills we were to encounter later on.

Monday noon we ran to Farmington, about 7 miles, and had dinner at The Willows, a very comfortable little hotel on a hill back of the town. We returned to Farmington Falls and left there about 2 o'clock for Waterville, a ride of some 25 miles, over good roads, and through rich farming country, abounding in fine farms and beautiful landscapes.

We stopped for an hour at the Belgrade, situated on one of the Belgrade lakes, famed for its fine bass and trout fishing. The proprietor of this popular resort took us into the storeroom and showed us some fine specimens of recent catches—among others an 8 pound brook trout, taken the day before by one of the guests, and numerous fine bass.

AN HISTORICAL LANDMARK.

We reached Waterville early, and remained there over night. The one point of special interest there is the old block house, erected in 1754 as a protection from the Indians, and known as Fort Halifax. It was here that Benedict Arnold stopped on his way to Quebec to procure boats and canoes; and I was fortunate enough to get a good picture of the old fort as it stands today.

Here we crossed the Kennebec River and proceeded through North Vassalboro and South China, past the beautiful China



ON THE WEST BANK OF THE ANDROSCOGGIN RIVER.



VIEW FROM CAPE COD HILL LOOKING TOWARD THE RANGELEY LAKES.

Lake, one of the largest and finest bodies of water in this portion of the State. From there we found the roads very hilly. We expected to go to Wiscasset, but decided when we reached Jefferson Post Office to strike off to the left and go on to Rockland, about 30 miles farther east. Before reaching Jefferson we passed through the little towns of Week's Mills and Cooper's Mills, and while nearly all this run from China Lake had been either up or down hill, we were surprised, when about 5 miles from Cooper's Mills, to see the road ahead of us disappear over a small mountain, such as even a Harlem goat would look at twice before attempting to ascend.

There was no chance for a start. Small stones and boulders, washed bare by the down rushing waters of every rain, made the roadway rough. With a silent prayer that my slow speed clutch would hold and my well tried chain would stand one more good stretching, we started up a half mile climb. We were three-fourths of the way up when we struck an especially sharp rise,

We climbed a good many hills before we reached Rockland, but no hill which has a wagon road on it will hereafter cause us any unrest. We have, so the inhabitants tell us, climbed the "worst hill in Maine."

From Jefferson we ran through North Waldoboro, North Warren and Warren to Thomaston, where we refilled our gasoline and water tanks, and ran on 5 miles to Rockland, and a couple of miles farther to the Hotel Samoset at Rockland Breakwater, which commands a sweeping view of Penobscot Bay for miles. Vessels of any draught may enter this beautiful harbor, and here the United States Government, by twenty years of work and the expenditure of over a million of dollars, has constructed one of the greatest breakwaters in the world. It is about 20 feet wide on top, runs out into the bay nearly a mile, and a lighthouse has been established at the sea end, which is in 60 feet of water.

We spent two days there, and expected

consultation. In the meantime it began to rain, and I advised the ladies to take the train for Poland Spring and let me and my son John stand by the wreck until it "could sail under its own power" again.

After breakfast I went out to examine the extent of the injury, and found that the rear connecting rod had broken off short about 1 inch back of the crank bearing and that the fracture showed a flaw of long standing, as it was black over nearly one-half the broken section. The broken end had banged around and broken the rear piston. After taking off the crank bearing, which was loose and free, showing a polished surface on the brass liners. I started up on one cylinder and ran back under cover.

REPAIR PARTS PROMPTLY SUPPLIED.

On telephoning the company's agency in Boston, I was fortunate enough to find that they could express me a new rear cylinder, connecting rod and crank case cover. So after seeing the rest of the



VIEWS OF THE ANDROSCOGGIN RIVER, SHOWING RAPIDS AND DAM.

and for the first time my engine, which was getting a little too much gasoline for that slow speed, stalled before I could save her.

DIFFICULT MOUNTAIN CLIMBING.

I held the car, however, thanks to the excellent double acting brakes, until Mr. Atwood could get out and build a small stone wall behind each rear wheel. Then I looked, not back, but down to the far off bottom, and wondered if we had really driven up such a grade—a 2,500 pound car loaded with five people and supplies.

I asked the ladies to step out while I started my engine, and they decided to walk up the rest of the way.

The last pull was the hardest, especially getting started from rest on such a grade; but the clutch took hold, and up she went in good shape. I am sorry I did not have a gromometer with me, but I know it was over 50 feet to the hundred when we stopped, and I only wonder that the tires could get a grip. The roadbed, of course, was dry and full of fine sand and gravel.

to leave Wednesday morning, returning by Bath and Brunswick; but the unexpected often happens.

A CONNECTING ROD BREAKS.

I got up early and went to the stable to have everything in readiness for a start after breakfast. I filled the lubricating oil tank, oiled the rear axle and steering rod joints, looked over brakes and chain, and decided to run up to the hotel for water. A half dozen youngsters were standing about and I invited them to ride up to the house—perhaps 200 yards. We had not gone more than half way when a crash and bang indicated trouble, and instantly stopping the engine I got off to see what was up. A small piece of the aluminum crank case cover lying on the road told me all before I took off the cushion and saw, as I expected, the broken end of the rear connecting rod sticking up through the crank case.

After reporting the condition to the party, we went in to breakfast and held a

party off. I proceeded to take the seats off the car, remove the top of the engine case and unscrew the studs from the end bearing of the crank shaft, so that no time would be lost the following day in refitting the new parts when they should arrive.

I was called at 6:30 the next morning, and was delighted to find that the new parts had arrived on the night express, and by 8 o'clock my boy and I had our breakfast and were at work—that is, I was at work, while he bossed the job.

I saved time and made sure of a good fit by fitting the brass liners from the broken rod into the new one, and was pleased to find that the rear piston fitted the cylinder perfectly. By dint of hard work I had the connecting rod fitted at 11:30 that morning and ran the engine under her own power to test the bearings. After a half hour's run I inspected the bearings carefully, and after a little more fitting was satisfied to call the job done and began to put on the crank case cover and connect the lubricating oil pipes and air line. We

stopped for lunch at 1 o'clock and at 3 we had the car out, running as well as ever.

Mr. Atwood was due to return at 4:30 that afternoon to help me, but I was at the station to meet him, and we started back at 4:30, bound for Poland Spring via Gardiner.

At Thomaston we stopped for gasoline and then went on through Warren, North, Waldoboro and Jefferson. It was getting dusk, but we were making good time, when near Jefferson I turned out for a large boulder on a little knoll. The grass and bushes along the roadside looked level enough in the fading light, and I ran outside the road only a few inches, but there was a smooth ledge slanting from the road toward the gutter, hidden by the grass, and as my front wheel struck that it turned the whole car slightly toward the gutter. I swung back toward the road as best I could, but not before we had grazed a boulder as big as a cider barrel, which gave us such a jolt and jar that I feared something would give way, and something did—it was the air line, for I found I had no control of the engine speed.

AIR LINE LEAKING.

I found the body of the car had moved slightly, breaking the pipe line. After a half hour's search I found one leak, which I stopped with rubber tire tape, but I still could not find the main leak. It was quite dark; the roads were strange to us, and very bad, and my engine wanted to run at racing speed. However, I decided to push on and govern the speed as well as possible by dropping the spark and cutting off the engine with the switch.

It is easy enough to do all this in the daytime, on a good road, when you can see ahead and prepare for grades, either up or down, but at night grades are deceiving, even with a searchlight—and as I was on the side of caution rather than speed, we made rather slow progress.

Once we got stuck on "Sand Hill," because the slow speed clutch slipped—and it's no fun tightening a clutch on a 20 per cent. grade. However, we pulled out, or rather up, and felt our way about 6 miles farther to North Whitefield, a village of possibly ten houses, where we heard we could "put up."

It was about midnight, and we found the town asleep; but Mr. Atwood soon had someone up, who directed us to the man who "took boarders." We were all glad enough when the proprietor came down, bareheaded and barefooted, and opened the stable door for us to run in.

We dined on doughnuts, cookies, three kinds of cake and tea, and had the same menu for breakfast, plus boiled eggs and potatoes. By daylight it was easy to find the leak in the air line, and by 10 o'clock we were off, as happy as kings. It was a beautiful day—clear and cool—and the ride from there to Auburn through Gardiner was delightful.

We reached Auburn, about 40 miles, in time for dinner at the Elm House, and early

in the afternoon we were pulling up the hill to the Poland Spring House, which we called home.

We shall leave here in a few days, and expect to return by easy stages through the Berkshire Hills, down the Hudson to Newburgh, and across to Milford; through the Delaware Water Gap to Easton, and so to Philadelphia, and home to Overbrook. Then, after the car is safely housed, I hope to have time to write up the log book, which will be interesting reading for the members of our party in after years.

So far our trip has been delightful, and we feel that hereafter all of our vacations shall be spent touring in a motor car.

A Four Hundred Mile Tour in New England.

By ROBIN DAMON.

I have just returned from an automobile trip through Massachusetts, New Hampshire and Maine, and I should now like to meet the men who go on such tours and "never have any trouble." I did have some trouble, but I brought the machine back home on schedule time, and kept every date planned. It was a strenuous life at times, however, to bring about the desired results.

THE CAR AND ITS TOURING EQUIPMENT.

I have a 1902 touring car of a popular make, and deservedly so. During the spring I ordered a new tonneau, divided front seats and a canopy top. They were completed and adjusted the day before the trip started, which was August 9. Previously I had put on new springs, with steel castings extending in front and rear, so that the wheel length was 14 inches more than originally. This, with the new seats, made the carriage ride quite comfortably—as easy as any tonneau vehicle.

My party consisted of myself and wife, a friend and his wife and two boys of ten years each. This made six passengers, four of whom were in the tonneau, which was rather crowded, but not uncomfortably so, as the rear seats are wide, and there is one on the door. Two dress suit cases were stowed under the seats, and wraps were used as cushions. A gallon can of gasoline and a big pump were also in the tonneau. One of the boys said he would have to hang his feet over the sides, but his idea was vetoed.

THE START.

We started at 10:45 a. m. for Portsmouth, N. H., a distance of 50 miles. The engine worked finely, and as we have good roads here, a speed of from 25 to 30 miles an hour was secured without difficulty, in spite of the heavy load. The only incident was that a battery wire broke when we were about 10 miles away. This was soon discovered and remedied. It took two hours and ten minutes to cover the 50 miles to Portsmouth. We stopped for dinner two hours, and then found the canopy top handy, as a drizzling rain commenced. The curtains were buttoned down, so that

the passengers were shielded from rain, and a big boot in front protected the driver. I omitted a glass front, as I am afraid of heavy glass in a machine so liable to collisions as an automobile is.

The destination we had picked out for the night was Wolfboro, N. H., 55 miles away, and the time was 3 o'clock when we got under way. For the first 25 miles the roads were pretty good, and then mud commenced to show. With very narrow roads, covered with wet clay and soil, slow speed was necessary for long distances. The hills were especially bad, so that the water heated quickly and evaporated rapidly. At the end of one long hill climbing experience, somewhere in Middleton, N. H., steam came forth, and we stopped at a farmhouse for fresh water. The farmer and his family gave a cordial invitation to help ourselves, and even hauled the water out of the well with the old fashioned sweep.

While this was going on the aged farmer assumed an impressive manner, and, pointing at a small hole in the street, said: "Right on that spot three weeks ago a big automobile like yours broke off an axle." He sent to the barn and we were shown the broken axle. This was cheering news. The farmer said the man and his party were driven 4 miles to a railroad station, and machinists came up in a few days and fixed up the carriage. I looked over my axles carefully to see if there was any chance of their snapping off, but they were apparently all secure.

From Middleton to Wolfboro was to or 20 miles. Anyhow, it was a tough road all right. Sand came in spots, and where that was missing mud had been applied. In going down one steep hill, where sand was deep and rutted, the front wheels got in one row and the hind in another. Then the tonneau tried to push itself to the front. Fortunately there was no gutter at the side of the road, so we brought up against a pile of sand without injury.

TIRE TROUBLES.

The brakes were in constant use, so that they commenced to grind, the adjustments having slipped. We stopped in front of a farmhouse to fix things, and just as I was getting out a wrench there was a loud report, sounding like a young cannon. It was a front tire that had taken the opportunity to explode, ripping a big chunk of rubber out of the side. We were then 8 miles from Wolfboro, standing in a mud puddle, and with a brand new cover tied to the front of the machine. It was 6 o'clock, and after a few minutes' calculation I figured it out that it would require about three hours to put on the new tire. The old cover was ruined, and I guessed that the inner tube must be in bad shape. We had four extra inner tubes, and so I decided that we would keep on with the flat tire. In a few miles we hit decent roads, and then spurred along at good speed until within a mile of Wolfboro, when the front wheel commenced to bump.

I found that the tire had worked itself

half off, and was stretched and cut. I managed to get it back on the rim and keep going at slow speed. I fixed that old tire four times in running 2 miles, and it was a muddy job. We kept on crawling along, and finally struck a hill that seemed to be a sure enough hill, for we were on the up grade ten minutes. Finally I stopped and called at a house to see if anybody had taken Wolfboro in out of the rain. The lady who came to the door said we had passed the town—that it was at the foot of the big hill. That was nice, certainly, for we were obliged to keep crawling to the top to find a place on the hill wide enough to turn around.

When we reached such a spot the tire came off again, and while I was working around the machine I discovered that one of the brake irons had broken off. That left only the reverse as a brake, and so I made all the passengers get out, while I piloted the carriage down the hill. At the foot we found a hotel, known as "Hobbs-Inn." We were there, too, and proved to be a very obliging old gentleman. We found rooms, and a whole stable was given to the automobile.

RENEWING THE TIRE.

Early the next morning I telephoned to Boston for two new tires, and also to Salem to have a man come up with them, if there was any doubt about the express company delivering the goods. Monday we had planned to sail over Lake Winnepesaukee, and we went on the trip. When we got back to the hotel a mechanic was there with the tires. He said the tire people forgot to send them to the express office, or something else went wrong, and so he came personally. I was glad the man was on hand, for it was a big job to get the tire in place. This was because the valve stem was too large for the hole in the rim, and we had to hunt around for something to bore it out. After two hours of hard work the tire was landed in place. Then the machinist discovered that the device for locking the tires on was not right. A steel lock washer had been provided, against which it was proposed to turn a brass cap. The bolt was not long enough to let the brass cap catch, and one of the caps got cross threaded, or stuck in some way, so that it refused to come off. The mechanic worked an hour over it, and then had to file the nut off. He then used the old thumb screws and secured the tire in place.

After the tire was fixed the machinist worked on the broken brake and some other things that were out of order. I went to bed at midnight, leaving him at work. I do not know when he finished, but the machine was all right for the next morning's start, when we commenced the journey toward Fryeburg, Me., a distance of about 50 miles. The roads were in excellent order for some distance, and we enjoyed the ride finely. Horses bothered us a great deal, because Wolfboro is a sort of centre, and about all the residents were on a shopping expedition. It was the rule to stop the car-

riage and engine for every horse and help lead the animals past. This was done so well that we did not cause a single runaway or smash a wheel.

SAND CAUSES TROUBLE.

After traveling for about two hours we suddenly ran into a sand hill that was the worst we had met. The engine struggled nobly, but when the wheels went in to the hubs we stopped. The ladies and boys pulled branches from bushes and ferns, with which we made a path over the sand for a few feet. Then I took down sections of a board fence, and laid a new roadbed, over which we finally managed to reach the top of the hill to hard ground. It took an hour to cover the 50 feet, and tremendous exertion for the engine. At the top of the hill, while rain was pouring in torrents, a man came along and politely inquired where we were bound. We told him we were looking for a hotel that must be near. He said that we were on the wrong road, and must go back about a mile and then turn off to a good road. We gladly turned around and went back through the sand. Words were useless, for nothing would fit the situation. I know the man who told us how to go, and if I ever pass through the territory again I shall certainly call on him and explain the matter to him.

It took only a few minutes to get back to the right road and reach the hotel, which proved to be a first class establishment, where we had a good dinner. I looked over the automobile, and found that one link of the chain had stretched out a quarter of an inch, accounting for a clicking noise I had heard for some time. The hardened steel rivets had been pulled almost through the side pieces. Luckily the stable had

A HANDY MAN

there who agreed to put in a new link, and he performed the job in good shape. It saved me a greasy, back breaking job, and I did not regret the dollar he was given.

After dinner we pulled out again on the road for Fryeburg, having been told how to avoid another sand hill. There was a hill that horses could hardly pull up, and the road builders had put a track around it. This new track was about as sandy, only it was not quite so steep. We just managed to pull through with the passengers out. Later there was still more sand, mud and hills, all the way to Conway. Then we had fairly decent roads—for New Hampshire—into Fryeburg, which we reached early in the afternoon, stopping at the Oxford House, one of the best in Maine, considering the size of the place. The town has a street railway 2 miles long, upon which one horse pulls a small car every time a train enters or leaves the town, which is four times a day.

There did not seem to be anything necessary to do to the machine in Fryeburg except to put in some fresh water and adjust the spark points. Early Wednesday afternoon we started for Bridgeton, Me., a distance of 40 miles, and made it without dif-

ficulty, running considerably on slow speed, as there were many hills. Just outside the town the engine stopped, and I found that the gasoline was gone. We had used 12 gallons in going less than 90 miles. Here the extra can of 2 gallons worked in. While putting in the gasoline I found that the brake iron had snapped off again. At Bridgeton we found a hotel with modern methods and an accommodating landlord.

EXCURSION BY STEAMER.

On Thursday we took a 70 mile ride from this point on the Songo River and Sebago Lake, traveling in a bit of a steamboat that threaded the winding waters of the river with marvelous skill. It was a pleasant variation of automobilism, and gave me time to rest a little. Before leaving in the morning I had interviewed a machinist and shown him what was needed to fix the brake. He promised to see that the job was done. When I got back I found that he had made a new iron, but he did not put it on because he didn't know whether I would like to have him knock out a couple of rivets. Again words were useless.

After dinner I went out and worked four hours fixing the brakes, tightening nuts, adjusting the battery, etc. I had also arranged to have 12 gallons of gasoline at the stable, but the merchant told me in the morning that he had not delivered the goods because he had only 5 gallon cans, and he could not get 12 into one of them. I asked him why he did not send three 5 gallon ones, and he answered that he never thought of that. The gasoline matter delayed us an hour, as the store was a mile away, and the barrel was half a mile in the fields, with only a gallon measure, which was carried back and forth twelve times.

Eventually we pulled out of Bridgeton for Old Orchard, another 50 or 60 mile stunt. The roads were generally good, with little sand—for Maine—and no bad hills. When within 10 miles of Portland we stopped to get some apples and also to put in fresh water. Here trouble came, for the engine refused to puff when the handle was jerked briskly. All the connections to battery, spark plugs, etc., were gone over, and finally a new battery was hitched up, but the engine was still obstinate. It required two hours to make that machine run. Then the engine behaved all right.

CONNECTING ROD BEARING HEATS.

We ran into Portland in fine style, over decent roads, and after inquiring the way, started for Old Orchard. Here let me say that I should advise automobilists to approach Old Orchard from some other point than Portland, for the road is harder than anything we hit away back in the mountains. The sand is deep and shifting, so that the wheels cannot get a good grip. Of course, we pulled through, but the exertion or something caused one of the connecting rods to heat on the crank shaft. We stopped at a village 4 miles from Old Orchard to cool off the iron.

When the bearings seemed cold a lot of

oil was poured on them, and we ran on to the beach road, a good, smooth spot. In less than five minutes I heard a crash and snap in the crank case, but the engine kept going, with only one cylinder. I did not stop to investigate, as I wanted to reach Old Orchard in season to get a train for home, and we only had forty-five minutes. The single cylinder carried us on at good speed, and we got to the hotel with fifteen minutes to spare.

I hastily uncovered the crank case, and found that the rear

CONNECTING ROD WAS BROKEN

and nothing else was injured. I called the train for Salem, and from there telephoned to the Boston office of the concern handling my machine. The answer was that the last rod had been sold. I then took a train for Boston, caught the midnight train for New York, and went to the headquarters in that city. The young man in charge of the stock room said he was sorry, but he had sold the last connecting rod a few days before. Here was a pretty mess. Just as the young man was trying to think of some place in the city where there might be a spare rod an expressman came in with three boxes from the main factory, and one of them was filled with connecting rods. I took two and reached the railroad station in season to take the Bay State Limited for Boston. From there I took a train for Old Orchard, with the precious connecting rods in my grip.

While in Salem I had arranged with a local machinist to let a man meet me in Boston and go down to make the repairs necessary. He took a new brake rod, as the first two had broken. When the man reached Old Orchard he donned his working clothes and started on the job. At 11 o'clock he was ready to put the rod in place, and then found that the wrist pin did not fit, the hole in the rod being too small. He was the sort of a man who would "carry a message to Garcia" or anyone else, for he inquired the way to a machine shop, which was at Saco, 5 miles away. He couldn't get a horse, and so he walked the railroad track at midnight to Saco. There he found a machinist, and they opened up a shop and fixed the rod. It was morning by that time, and the machinist was able to get a trolley car for Old Orchard. He worked until noon to put in the rod, new packing, fix the brake and repair the chain. Then the machine was in order again. We left Old Orchard at 3 p. m., and ran in fine shape over some good roads and some that were covered with sand, the latter being near Wells.

A BROTHER AUTOMOBILIST IN TROUBLE.

Just as we were running out of Biddeford a farmer in a wagon stopped us and said that a few miles back there was a carriage like mine with a bad tire, and that the two young men in it wanted help. We hurried along and met the two men, both without coats, trudging through the sand for Biddeford. I had two extra tires, and

told them I would let them have one. After some hesitation they accepted the offer, and rode back with me to their own machine, which had been drawn into a farm yard. The young men started work on the tire when we left, but I think they had a hard job, for they did not catch up with us.

At 5:45, when within a mile of Portsmouth, I stopped the machine to inquire the way, and then I heard a hissing from one of the front tires. It was a puncture, and the wind went out quickly.

There was nothing to do but to put in a new tube. Fortunately a man employed in the Kittery navy yard, who had owned a bicycle some time and was a good mechanic, came out of his house to see what the trouble was. I pressed him into service, and we pulled off the old cover in quick time. We found that a rock had cut a hole clear through the rubber, and I did not have anything to mend the gap, while the young men had the cover I should have put on. I had still another cover, but it was new, and I knew from experience that it would be a tough job to put it on.

AN OLD SAIL COMES HANDY.

We decided that a strip of canvas cemented to the inside of the cover would hold the inner tube, and the navy yard man said he had an old sail at home. He went after it, and also cemented it in place. We then put the cover on the wheel easily, but the bolts that clinch the tire refused to go into place without a lot of urging. It took three hours to get that tire on—and some men say they can replace a tube in twenty minutes.

At 9 o'clock we started for Salem, 50 miles away, and as we then had decent roads, good time was made, so that we covered 40 miles in less than three hours. This was in Ipswich, and there the engine stopped, because the gasoline was used up. I had about a gallon in the spare can, but that would not carry us home I judged, and so we hunted up the man who sells gasoline in that town, and got him out of bed. He kindly went to his store, which was a mile from his house, and then found he had left his keys. A cold chisel and stout hammer from the automobile tool box soon forced open a rear door, and then the gasoline was secured. Two gallons were poured into the tank, and that gave ample supply. The remainder of the journey was made without incident and in quick time.

SUMMARY.

We traveled nearly 400 miles, without excessive fatigue, made all previously planned connections and hotels, did not cause a single runaway, and all on the automobile escaped without a scratch. The only real accident was the broken connecting rod, and I think that was from neglect in oiling at a time when the engine was hard pressed. I had previously made trips to the end of Maine and also to New York, in single cylinder machines, and all were hard propositions, on account of lack of power. With the larger engine the difficulties were

smoothed over. In a few cases we could have employed more power to advantage, but we got along all right, and as a rule we were able to travel much faster than the roads would allow.

The experience taught me that it is wise to take all broken parts to the supply depot, so that they may be fitted right before traveling a long distance. I also learned that storage room is valuable, and that the automobile as turned out by the maker lacks that essential. I had ordered a baggage rack for the top, but I found that the machine would then be so high it would not go into the ordinary stable, and so it was left off. Anyway, I do not believe that it would be comfortable riding with 100 pounds of baggage on a canopy top, as there would be too much swaying about. Baskets can be carried, and I have two large ones, but water gets into them, so that they are not very valuable on a long trip.

I should imagine that automobiles as now built—the first class ones—could be safely run for long distances, provided the makers would provide duplicate parts that fitted promptly. I expect that things will smash if not properly cared for, and I do not object to replacing them, provided they will drop into their bearings without going through a lathe.

Tires we expect to have bother with, of course, but if the makers would not change the size of fittings there would be some trouble saved. When one is in a wilderness and wants to put in a new tube, it is exasperating to discover that the valve stem will not fit because it is too large for the hole in the iron rim of the wheel.

Through the White Mountain in a Steam Carriage.

BY JAMES L. JENKS.

In November, 1902, after a thorough and careful investigation of the merits of various steam and gasoline carriages, I fixed upon a steam carriage of the chainless type, having the engine fully encased in a copper cylinder, as the one best fitted to my needs. The carriage has a drop seat in front, which makes it capable of carrying four persons when desired. I bought the carriage chiefly for the purpose of getting outdoors and making occasional vacation tours.

COLLECTIVE TOUR PLANNED.

In the spring of the present year I planned to take a trip through the White Mountains, and it was not difficult to find a couple of my friends, whom I will call the doctor and N., to undertake the trip with me, they both having steam carriages of the same type as my own.

We laid our plans to start Tuesday, July 13, weather permitting, and decided upon a course from our home in Pawtucket, R. I., to Boston, Mass., thence via Chelsea Ferry, through Chelsea, Lynn and Salem to Newburyport, where we intended to stop the first night. Each of the carriages was pro-

vided with two extra inner tubes and one extra outer cover, besides various duplicate parts that might be needed in and about the machinery.

Tuesday morning, July 13, dawned beautiful and bright. We left Pawtucket about 10 o'clock, and proceeded at the rate of about 15 miles an hour through North Attleboro and Wrentham to Walpole, where we stopped to take water. The doctor and I were somewhat in advance of N. and were all through at the watering trough when N. came up and stated that there was something wrong with his reversing gear. The sun was warm, but we took off our coats, removed the casing from the engine, and found that the pin which held the reversing gear in place had slipped out. Luckily the pin itself was found in the casing, and we at once set to work to replace it. The tool chest was called into requisition, and with the aid of file, hammer, chisel and wrenches we finally replaced the pin, fastened it securely, put on the casing and resumed our trip, about an hour having been consumed in the task.

WATER INDICATOR DECEIVES.

My indicator had been working unsatisfactorily for a few days before the trip, and on the day preceding our start I had sent to the factory at Newton for a new one. It arrived about 6 o'clock Monday evening, and was put on by a local machinist after dark, and under somewhat difficult circumstances. It appeared, however, to operate properly, and I made the start on our long tour without misgivings. Before we reached Boston, however, I began to discover that the indicator was not working exactly as it should, and on Columbus avenue, just before we stopped for dinner, while my indicator showed a full boiler, I heard a loud hiss below the carriage, and an investigation showed that I had blown a safety plug. While the other members of the party were at dinner I replaced the plug and removed the counterweight of the indicator and cut off a small portion of it, as the float of the new indicator was a trifle smaller than the old one and I had used the same lead counterweight that I had had with the old indicator.

About 2 o'clock we resumed our trip, everything working satisfactorily; we crossed the ferry and ran down an exceedingly pleasant road through Lynn, Salem, Beverly Farms and Rowley, but as we approached Ipswich N. began to notice that his

BURNER WAS NOT WORKING SATISFACTORILY

and reported that he was having difficulty in keeping up steam. We accordingly slowed down a little for him, although the roads were in prime condition and strongly tempted us to strike out at a speed of 15 or 20 miles per hour. Our slow pace, however, did not seem to help matters, and finally about 4 o'clock in the afternoon the doctor said: "We might as well

stop and fix this burner of N.'s because it will have to be done sooner or later." I suggested that we continue the best we could until we reached Newburyport, where we would have time after supper to fix it, but as a shower appeared to be coming up and as there was a convenient shed in the farmyard where we were then discussing the subject we decided to pull under the shed, with the farmer's permission, and see if we could not make the burner operate properly.

We accordingly went to work for a second time on N.'s machine; took the burner and all the piping apart, carefully cleaned and blew through it, removed the wire filling of the vapor tube over the burner and cleaned that thoroughly, and then replaced everything in position and started the fire once more. For a few minutes it seemed to burn properly with a good blue flame and a strong roar. The steam came up rapidly and we determined to make our start. The shower was over, the roads were beautiful and the weather was perfect. We had spent about an hour on the carriage and it was approaching 6 o'clock.

For perhaps a half mile everything went successfully, when we again heard N. blow his horn as a signal of distress, and, stopping, discovered that the burner was working as unsatisfactorily as ever. We were then perhaps a mile and a half or two miles from Ipswich. There was nothing to be done but to tow N.'s carriage to that town and, leaving it there, push on to Newburyport. A clothesline was procured from a nearby farm house and, the doctor having nobody but himself in his carriage, took N. in tow, and after somewhat laborious progress we reached Ipswich.

We found an accommodating stable keeper, who agreed to put up the carriage until we could get it repaired, and then the doctor took N. aboard his carriage and our two carriages steered northeasterly for the city of Newburyport. It was getting toward dusk, the roads were fine, and I am afraid we violated local as well as State speed laws, if there are any in that portion of Massachusetts, for we made the distance between Ipswich and Newburyport in record breaking time. At Newburyport we stopped at the Wolf Tavern, a fair hostelry, and after supper held

A COUNCIL OF WAR.

It was clear we could proceed no further with N. until his carriage was fixed. It was also evident that we should not all be delayed on account of the misfortune to one carriage alone, as we did not know how long it would take to make the repairs. We finally decided to call up the manufacturer of the carriage at his home in Newton by telephone and have him send a man up to Ipswich at the earliest possible moment Wednesday morning to put the burner in shape, N. to remain until it was done, while the doctor and I proceeded on our journey. The manufacturer was reached, agreed to have his man come

to Ipswich, and we turned in somewhat weary with our day's labor.

GASOLINE PUMP REQUIRES REPACKING.

The next morning the doctor and I started about 9 o'clock, after having filled up with gasoline at the Blue Book Station on Washington street. We crossed the new bridge over the river just outside of Newburyport and struck a strip of straight road when the doctor gave a signal of distress. The sun was boiling hot, there was no shade convenient (conditions which I have noticed as apt to prevail when a breakdown occurs on the road), and upon looking the doctor's carriage over we found that his gasoline pump was not working properly and required repacking. It is not an easy task to remove the old packing from the small stuffing box of a gasoline pump, especially when the best instrument available to accomplish this is a hat pin, but this was all we had, and for about an hour we worked at that pump. After getting the old packing out we found it almost as hard to shut the gland down with the new packing in, as the packing appeared to be a little too deep for the pump, but it was finally accomplished and a little after 10 o'clock we proceeded on our way to Portsmouth.

We reached Portsmouth shortly after noon; stopped at a restaurant to get dinner, and after dinner it occurred to me to telephone to Ipswich to see if N. had started. I called up the stable where his carriage had been left and found that he had gone from the stable in his carriage about ten minutes. We had therefore as a start the distance from Ipswich to Portsmouth, somewhere about 25 or 30 miles, and just where he would overtake us was a matter of conjecture.

OIL PIPE BREAKS.

I omitted to state that before reaching Portsmouth another little trouble befell the doctor's carriage. The pipe leading from the automatic oiler to the cylinder broke off close up by the pump. This was a curious mishap, as the pipe is of tough copper, uncommonly strong, and it would seem as though any amount of pounding over a rough road would not affect it in the least. Fortunately, the doctor had a spare pipe, and the matter of replacing this did not consume more than ten minutes, and at Portsmouth we stopped at a plumber's and had the old pipe repaired so as to have it in case of another break.

On reaching Dover we thought it advisable to take aboard another supply of gasoline, as we did not know where we might strike the next. From Dover our course was laid out through Rochester, Middleton, Wakefield and Ossipee to Conway, thence by way of North Conway and the Intervale through Bartlett and the Crawford Notch direct to Bethlehem. As far as Dover our roads had been excellent, mostly macadamized and good enough for any steam carriage. We were informed, however, at Dover that the best

way to Rochester was via Somersworth, and we accordingly changed our plans somewhat and went through the latter town. About 5 or 6 miles out of Dover, on the road to Somersworth, we struck our first New Hampshire hill, and it was a good one. Just what the grade was I do not know. It appeared, however, to be about as steep as the roof of an ordinary dwelling house; it also had a very poor surface, being composed principally of loam, and its length was interspersed with frequent mounds or "thank you marmas," which we found very convenient.

FEED PUMP TOO SMALL FOR GRADES.

We here discovered one thing which was brought home to us very painfully many times after during our trip, and that is that the automatic pump supplying the boiler, while it works with perfect satisfaction on slight grades or on a level, supplying, in fact, more water than the boiler demands, on steep hills would not supply water to the boiler fast enough, and while our steam power was ample for any hill we met, we found that on long hills we would have to stop sometimes once, sometimes twice, permit our steam to go down to not over two pounds pressure, and fill up our boiler by hand before we could start again.

This Somersworth hill was our first experience of this kind, but we surmounted it without trouble and were richly repaid by the first vision of the northern hills lying along the horizon miles away, of a most beautiful turquoise blue, and thousands of acres of beautiful farming land, here and there interspersed with lakes lying between. This was the first really fine view we had obtained, but from this time until we reached Bethlehem it was one long succession of equality.

CHARMING PANORAMAS,

and for me there is no way henceforth to travel through the mountains except by automobile, and I am certain that to a person who has suffered the stuffiness and heat and discomfort of a parlor car on the Boston and Maine Road a ride through the same region in an automobile would be a revelation of comfort undreamed of.

The roads beyond Rochester were not quite equal to those lying between Boston and Rochester, but were still fair country roads. We had now very little level work — it was mostly up hill and down. The doctor being lighter than myself was usually in advance, and as we went along every now and then I would see him and his carriage drop out of sight, as though they had sunk into an abyss, but on coming up I would discover that it was only one of the characteristic New Hampshire hills down which the doctor had gone as though he were on a toboggan slide.

The hills gave us no trouble in the descent, as the brake would ordinarily retard the speed sufficiently, and when it did not the reverse lever would answer the purpose. My own brake I knew was un-

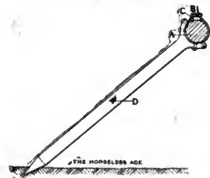
trustworthy in going up a hill, as it was a single acting brake. Accordingly I had made for me before I left home

A SPRAG,

a sketch of which I give. As the hills, however, gave us no difficulty I did not put the sprag on, but proceeded without it.

The second night we reached the little town of Ossipee and stopped at the Ossipee House, kept by one Huse, a neat, comfortable, old fashioned hostelry, where we were well fed and comfortably lodged. The night was cool, so much so that in the morning the host expressed the thought that there had been snow upon the mountains. Fortunately, right across from the hotel was the usual country store containing a little of everything, and among the rest a good supply of gasoline.

Thursday morning dawned bright and beautiful, it having rained, however, a good portion of the night. The dust was thoroughly laid, the roads were in splendid condition, our machines were working finely, and we left Ossipee with the intention of reaching Bethlehem that night.



A, REAR AXLE; D, ONE INCH STEEL ROD; C, LEATHER STRAP ONE INCH WIDE; B, BUCKLE.

Our intentions, however, were not carried out, as the sequel will show.

Our road lay through Bear Camp and Madison to Conway, thence through North Conway, Glen Station and Bartlett through the Crawford Notch. After leaving Bear Camp, some miles from Ossipee, we passed through a long stretch of sand. Fortunately the rain had packed it into pretty solid, so we went through it without trouble, but had there been a week of dry weather our progress would have been very materially checked.

PARTY REUNITED.

A little before noon we stopped at one of the beautiful New Hampshire brooks, where there was a plank laid across and a tin pail, apparently for the benefit of thirsty horses. We had just turned in from what appeared to be a branch road upon apparently the main road leading to Madison, and had got our tanks partially filled, when off by the branch road down which we had just come all at once we heard the sound of a horn. I remarked to my wife that from the sound it appeared to be a big touring car, but in about two minutes we saw a steam carriage tearing down the

branch road at top speed, tooting its horn vigorously, and the man at the helm was none less than our friend N. We were delighted to see him and he no less delighted to see us. We found that he had made Dover the night before and had arisen that morning about 5 o'clock and started without any breakfast, having stopped at a grocery store and bought a few cookies and had pushed on at top speed until reaching us. His burner was in splendid condition, and he found it difficult to keep his steam down where it belonged. Thenceforth we traveled together.

SCENERY WILD AND GRAND.

The scenery now became very much wilder and grander. Looking northward we could see that showers were falling among the mountains, but paid little attention to it, as it was beautiful sunshine where we were. We reached Conway shortly before noon. I stopped for an instant at a drug store, while N. and the doctor continued, and when I started again they were perhaps a quarter of a mile ahead of me. As we passed the big Conway Hotel at the crossroads I stopped to make sure that we were pursuing the right course and asked a man upon the porch if we were on the road to Crawford Notch. He informed that it was the road, but that it was at present impassable, on account of the destruction of a bridge near Glen Station. He said further that the only way to reach the Notch would be to turn sharp to the left and keep on the west side of the Saco River all the way, going up by the Cathedral and Whitehorse Ledges and Diana's Bath to Bartlett.

I instantly tooted my horn for the doctor and N., but they were too far ahead to hear it. I accordingly made up my mind to wait a little while, as we had arranged that in case any one of us disappeared on the road those ahead should wait until he came up, and if he did not appear within a reasonable time they should turn back to see what the trouble was. After a half hour's wait N. appeared. I asked him where the doctor was. He said that the doctor had kept on and did not intend to come back. "Well," said I, "he will have to come back as the bridge is down at Glen Station, and there is no ford, and it will be impossible for him to come through the Crawford Notch by the road which he has taken." After considering the matter a while we both decided that we would better push on slowly and leave the doctor to overtake us.

THE DOCTOR IS LOST.

This would have worked very nicely had it not been for the fact that the doctor being alone had offered to take my little boy in the carriage with him, to which we had consented. As we now pushed on my wife began to be somewhat anxious over the little boy. It was past noon, the child had nothing to eat, and it did not look as if the doctor would overtake us very soon.

I did my best to pacify my wife's fears and urged very good reasons why she should not worry, but I could not discover that her anxiety was at all lessened, and for an hour and a half we kept on with still no sign of the doctor. I began to be a little uneasy myself and finally, after passing the Cathedral and Whitehorse Ledges, we drew up at a farmhouse, it being then about 2 o'clock, and inquired if we could get dinner. They agreed to furnish us with a dinner, and we put up our machines and went in to dinner.

The farmhouse was situated across the Saco River from North Conway and Intervale, the pleasant houses of which we could see in the distance, and after dinner, as the doctor did not appear, I determined to go up a crossroad to North Conway to see if he had passed through on his way to Glen Station. It was perhaps a mile and a half to North Conway, so I got up steam hastily and started. Reaching North Conway and making inquiries on the Main street, I found that the doctor had passed through there with the little boy not fifteen minutes before on the way to Glen Station. With all the speed of which my machine was capable I started in pursuit, and for 6 or 7 miles the chase was a warm one. I finally got sight of the doctor's red carriage, about a quarter of a mile ahead, as I came to a sharp bend in the road, and putting on a little extra speed I overtook him. He was amazed to learn the condition of affairs and said that he had fully intended to push on to Glen Station, and if there had been no bridge he declared he would have forded the river. Inasmuch as the river bed was one mass of boulders he probably would not have forded it a great ways. We turned back, reached the farmhouse safely, and the anxiety of my good wife was at an end. The boy was safe and sound, albeit a trifle hungry, but he had a good dinner and about 4 o'clock we resumed our journey.

APPROACHING THE CRAWFORD NOTCH.

As we drew near the Crawford Notch we could see that it was raining hard in the Notch, although it was clear and beautiful outside. The ride through the long arcade of sun flecked road just before reaching the Notch, with the hitches and maples arching overhead, was certainly enough to repay us for all the vicissitudes of the day, but the worst was yet to come.

After passing the Willey House, hemmed in by the mountains on each side in the great natural gorge formed by the Notch, darkness began to fall quickly. To make matters worse we had got into the rain belt and it began to rain. N ran short of water and had to stop at a mountain stream. As he had absolutely nothing to fill his tank with, he attempted it with a tin funnel, with very indifferent success, until alarmed at his absence I went back a quarter of a mile and found him in the midst of his predicament. He had, however, got enough water into his tank with the funnel to fill his boiler and after get-

ting up steam he continued until he reached the place where the doctor and I were waiting for him.

A little further on the doctor's

BOILER PIPE BROKE.

for a second time. The one he had had repaired in Portsmouth now came into play, and in a few minutes this was replaced and we resumed our journey. We reached the bottom point of the Notch shortly before 8 o'clock at night. It was growing dark rapidly and the rain was falling. The order of the carriages was—the doctor ahead, N next and I brought up the rear. The doctor and N. had got so far ahead as to be out of my sight in the growing darkness and I, upon looking at my indicator, discovered that my water was rather low. The grade began to rise very suddenly. We had reached the Crawford Notch Hill, although I did not then know it, but had guessed that we could not be far from the Crawford House.

I stopped my machine after going some little way up the hill, blocked the wheel and tried to pump a little water into the boiler by means of my hand pump. My steam pressure, however, was too great and I succeeded in pumping only a small quantity into the boiler. As I did not want to delay long in the darkness, and not expecting the hill to be a long one, I thought I would start on with what water I had and go as far as possible. The tank was well supplied. I had succeeded, however, in getting enough cold water into the boiler to reduce the steam from its normal pressure of about 350 pounds to a little less than 200. I remarked to my wife that my steam was rather low, but I thought it would increase as we continued up the hill. I opened the throttle and we moved slowly upward.

AN EXCITING EXPERIENCE.

We reached a portion of the road where upon one side there was a deep gorge filled with rough granite blocks, from which the traveler was protected only by one or two tree trunks which had been felled along the margin of the gully. A beautiful mountain stream gushed down from the mountain on the easterly side, forming a cascade which ran beneath a rough plank bridge forming a part of the roadway. The bed of the gorge at this place was perhaps 12 or 15 feet deep, and the gorge upon the west side of the road and partly upon the easterly side of the road also continued quite a distance both above and below the bridge.

We crossed the bridge in safety, when I discovered to my dismay that the hill, instead of becoming less steep, was becoming more steep, and a glance at my gauge revealed the fact that my steam, instead of going up, was going down. I said to my wife: "I am losing steam and am not sure whether we will be able to pull up with this pressure or not." The machine kept slowly on, however, until the pressure had gone down to about 150 pounds when the engine stopped. I put on the brake, told my wife

we were not going to be able to make the grade, and asked her to get out and I would do the same, and see if we could not run the machine light.

We both got out and for a few paces it went very well, and then again stopped. The road was slippery and muddy; it was raining hard and getting pretty dark. I thought the steam pressure would be sufficient to hold the carriage in place, but to my consternation found that it was not, and the carriage began slowly to move backward. I kept my hand upon the steering lever and slowly went backward with it. The speed, however, increased. I reached the plank bridge and crossed it safely, but by this time the carriage had got to going faster and I could not keep pace with it. It broke from my grasp, ran backward sideways, the left rear wheel struck one of the logs on the west edge of the ravine, bounded over it, and the engine, being released by the wheel being lifted from the ground, suddenly increased its speed to a thousand or more revolutions per minute with a loud roar. The jouncing of the carriage threw the cover of the tank off, and the water from the tank jumped into the air in a solid stream; then the right rear wheel struck the log on the side of the road and the carriage stopped. I had presence of mind enough to shut the throttle, and the grinding ceased. I said to my wife, who hurried back to where I was standing, "I am afraid this is the end of our automobile trip." She replied that she did not care a penny what happened to the automobile, so long as neither one of us was hurt.

SURVEYING THE SITUATION.

It was too dark to discover how badly the carriage was injured, but in an instant's time I had decided to have the carriage drawn by horse power, if necessary, to Crawford's, or to the nearest freight station, put upon a freight car and shipped to the factory for repairs. I found that with my own strength I was utterly unable to lift the rear portion of the carriage back to the road again. The front wheels had remained upon the roadway and the left rear wheel was hanging suspended over the gorge. I took up the cover of the water tank, put it in place and told my wife to go ahead up the road until she caught N, or the doctor and tell them to continue to the Crawford House and send down a man with a pair of wheels and a horse or two to pull me out. She disappeared in the darkness and I was left to my reflections in the gorge.

The rain now ceased, and looking up through the overarching trees I could see the stars shining through the darkness. After what seemed an interminable time I heard someone coming down the road, and presently N. appeared. He was amazed when he saw how narrow an escape I had had, and thought it was a matter for congratulation that nobody was injured. After looking the situation over N. and I together took hold of the rear springs and by our combined strength lifted the carriage.

wise, and at the first appearance of fright it was our practice to stop our machine at the side of the road until the carriage passed. Occasionally we had to get out and lead the horse by. We found that as a rule a horse would be somewhat quieted by our speaking to it from the machine, the horse appearing to think at first that it had no human agency connected with it, and the voice reassuring it.

I need not say that on our return my sprag was put to constant use, until we reached the city of Portsmouth, and frequently did most excellent service in going up some of the long hills, as it worked beautifully, stopping the machine promptly and without jar and holding it securely until we were ready to start again upon the steep grades.

It took us a little less time to return than it did to reach Bethlehem. Going up, we started Tuesday morning, reaching Bethlehem Friday noon. Returning, we left Bethlehem Monday morning, and reached home Wednesday night.

It was a beautiful trip to take. As I have said before in this article, it is the only way to see the mountains at their best, and having been there many times by rail, I can say in conclusion that as long as I own an automobile my trips to the White Mountains in the future will be by this means of conveyance.

A One Thousand Mile Tour in New Jersey.

By HARRY B. HAINES.

When I first decided to take a run equal to ten century trips I very carefully estimated the item of cost. My car will on the average go 15 miles on a gallon of gasoline, and as I have to date paid for seventy-nine gallons of gasoline at prices ranging from 16 to 25 cents a gallon, my mileage figures out to be over 1,000 miles. I estimated that perhaps five gallons or more of the fuel may have been consumed by the motor while running with the gears out during stops of various sorts. Estimating the average cost of gasoline at 20 cents, which is perhaps a rather low figure, the 1,000 miles cost me for that essential fluid \$15.80. A quart of cylinder oil is sufficient for a hundred mile run, but I was rather liberal and used nearly three gallons of lubricant on the trip, which, at 75 cents a gallon, amounts to \$2.25. Other greases cost about \$1 more, and with an item of \$16 more for storage, the cost of operation for oils, etc., is covered. The replacing of several parts that proved defective will also figure up and will be dealt with later.

I have run my car over 5,000 miles since last February, not counting this last trip, and before starting out on the 1,000 mile run I decided to have the machine taken apart and thoroughly overhauled. It was run into the repair shop for this purpose, and the "50 cents an hour men" began to get in their fine work.

I decided to oversee the job myself, and

for that purpose donned a pair of overalls and prepared to delve into the oily mysteries beneath the body. The body was first taken off, and this once removed, the entire machinery was of course exposed.

DRIVING SPROCKET WORN OUT.

I had been troubled somewhat with the chain jumping the sprocket, and upon examination it was found that the front driving sprocket was badly worn and had a tendency to hold the chain, as it came around and rolled it over. In order to get at this sprocket it was necessary to take out the motor and transmission, a job which, to say the least, was a tedious one.

Luckily for me two other persons owning the same sort of machine as mine had ordered new driving sprockets from the factory, having experienced the same difficulty. These came on the afternoon that I discovered my difficulty, and I arranged to get one of the sprockets at once, thus avoiding the delay of telegraphing the factory and waiting for the part to come.

The sprocket cost \$6, and there was eighteen hours' time, at 50 cents an hour, for putting it on, making an item of \$15 for this little job. I found the bearings throughout the car to be in excellent shape, despite their long service, and there was only a very slight amount of play in the connecting rod to be taken up.

The machine was finally put together, and when it was ready to be taken out it was found that two of the four tires had gone flat, and it was necessary to take off the outside covers and put in new inner tubes. This was done, and on the morning previous to the day on which I was to start I took the machine out to test it. Upon starting the motor it developed a strange knock, which upon investigation proved to be caused by the front end of the motor being loose, the bolt which holds it not having been drawn up tightly enough.

A jack was at once placed under the front end of the cylinder and this raised up, and this most important bolt tightened and fastened with a lock washer.

There was still another knock to be heard, and after due investigation the mechanic at the repair shop pronounced it to be due to the fact that the gears operating the fan and cam shaft, exhaust valve, etc., had worn. Of course, he said this did no harm other than making a noise—I afterward found that the knock was due to an entirely different cause, however.

BELT PULLEY LOOSE.

The front end of the motor tightened, I started out to run to my house, a distance of about half a mile from the repair station. I was about a block away from home when suddenly the air was rent with a loud shrieking that sounded as though a bearing was running hot. I ran up to the house and got out to investigate. Upon looking under the machine I noticed that the fan was not working and I at once stopped the motor.

I then took a wrench and tried to tighten

the set nut on the wheel that drives the fan. This pulley wheel, over which the fan belt runs and which is about 12 inches in diameter, was not revolving. The set nut would not hold it in place and I then saw that the pulley was cracked at that portion which goes on the shaft and the pulley had jammed up against the woodwork of the body, thereby causing the shriek. This pulley wheel is made of aluminum, no doubt used to reduce weight, and it would not stand the strain.

With less than twenty-four hours' time before I had planned to start, and no apparent way of getting a new pulley except telegraphing the factory and waiting for two or three days, I was for a time in a quandary.

I finally decided to go to a machine shop and have a wheel built up out of steel, and took the aluminum one off to be used as a pattern. On the way to the machine shop I met a friend, who advised me to have the wheel cast in phosphor bronze, and I decided that this was the best material.

After visiting several foundries I at last found a place where they were running that metal, and the man in charge agreed to cast a new wheel and have it ready in eight hours. This was 10 o'clock in the morning, and at 6 o'clock that night I had the new wheel. It cost me 25 cents a pound for the material, and there being 7 pounds the bill was \$1.75. I took the wheel to a machine shop, where it was finished up at a cost of \$1.

At 9 o'clock that night the new pulley was in place and the machine ready to run. These aluminum pulley wheels have given other owners of machines trouble and are entirely too light for the work they have to do.

ALUMINUM HUB PLATE CRACKED.

After the first 100 miles of my trip, while wiping the dust from one of the rear wheels, I discovered that the outside plate which forms the hub covering and also holds the spokes tight was cracked in several places. This also was of aluminum. The rear plate is of bronze and is stiff enough. I intend having the front plate cast from bronze to replace the aluminum one and am taking a chance on the other one holding up in the meantime.

Not to wander too far, after the pulley was put in place I noticed that the fan belt was badly torn. This was a comparatively new belt, having been in use less than a month, but the leather seemed poor. A new belt was put on and the possibility of an overheated motor avoided. Although I am not exactly sure of the price, I believe that this added \$2 more to the item of cost account.

By way of preparation I also purchased an extra inner tube for \$7.20, a new pair of tire irons for \$1.50, and expended an additional 50 cents for cement and rubber patches.

THE START.

The day of starting finally came, and our first run was to be from Paterson to

Asbury Park, via Newark, Elizabeth, Rahway, New Brunswick, Old Bridge, Matawan, Keyport, Red Bank and Long Branch, a distance of slightly over 90 miles.

The first 15 miles was made without incident in fifty minutes, and then, while going through Newark, the motor suddenly developed a knock that steadily grew worse. I stopped to investigate, and taking up the floor boards saw at a glance that the front end of the motor had worked loose again, the lock washer not having been bent up far enough to hold it from turning from the continual jolting of the motor and carriage. This bolt has an enormous amount of responsibility and occupies a most important position. It was necessary to jack up the motor from below in order to tighten this bolt, as all weight had to be taken off it.

I donned the overall suit kept in the back of the wagon for such occasions, and went to work, the usual curious crowd pressing around to "rubber" and hamper my movements. I found that the jack at its highest point was 2 or 3 inches too low, and an accommodating grocer's boy, who had pulled up his horse to see what was going on, broke up a box and gave me the boards to raise the jack, which filled the bill admirably.

The motor once jacked up, it was an easy matter to tighten the bolt. Luckily the thread was not stripped, and after drawing the bolt into place I jammed the lock washer up hard, and this little trouble was ended.

WITHOUT INCIDENT.

The remainder of the first stage of the trip from Newark to Old Bridge was made without incident, except that after leaving Newark the exhaust valve began to hammer strangely. From the noise it seemed to me that the spring used to pull the valve closed was too heavy and caused the valve to snap into place. I had put a new spring in before starting, and as I could not see anything else the matter, I ascribed the noise to this cause. I was not right in this conclusion, however, as I afterward found out.

I took 5 gallons of gasoline to fill the tank at Old Bridge, that amount of fluid having been used in covering the distance of about 50 miles. The price was 17 cents a gallon, rather lower than at most places.

Excepting stops for oiling, the remaining 35 miles of the trip was made without incident, but the exhaust valve still kept up its hammering. After reaching Asbury, in a running time of four hours and fifty-four minutes to the Hotel Brunswick, a stop was made for lunch. In the afternoon a run to Sea Girt and back and then to Long Branch and back from Asbury Park was made, making our mileage for the day considerably over 100 miles. The machine was put up for the night under a shed dignified by the name of "Automobile Garage." It cost a dollar a night, in return for which

the wagon was stored and cleaned (after a fashion).

CAM ROLLER STUCK.

The following morning I decided to learn positively what was causing the exhaust valve to knock, and if necessary put in a weaker spring. Upon taking out the rocker arm which operates the valve I found that the little steel cam roller was badly worn in one place, having a depression on it at least an eighth of an inch deep, and extending the full width of the roller. This wheel had apparently stuck from lack of oil, owing to the small oil hole provided having stopped up, and did not revolve as the cam hit it. The result was that a hole was

and return via Old Bridge, a distance of about 85 miles each way, making 170 miles for the round trip, selecting the longer route in order to take a friend to New Brunswick. This run, however, extended into 300 miles or slightly more before we returned to Asbury Park, as on our way back from Lakewood we decided to run into New Brunswick and from there to Trenton, which we did.

TIRE PUNCTURES.

Our start from Asbury Park was made at 9 o'clock in the morning, and we had not gone 5 miles before a stray horseshoe nail dug its way into the right rear tire, puncturing it. A half hour's time was expended in taking out the old tube and put-



ROUTE OF MR. HAINE'S TOUR

pounded in the face and the noise resulted. I at once sent a special delivery letter to the repair shop at home, and two days later received a new piece through the mails, which when put in stopped the noise. It was this knock that the mechanic at the repair station had pronounced as being due to the gears operating the cam shaft being worn. During the time that I ran with the flat wheel, while waiting for the new one, it continually ran hot and the pin on which it revolved was badly cut, despite the fact that I kept it as well oiled as possible.

After running up and down the Atlantic coast for a day or more, visiting places within a radius of 25 miles of Asbury Park, I decided to make a trip to Lakewood

and return via Old Bridge, a distance of about 85 miles each way, making 170 miles for the round trip, selecting the longer route in order to take a friend to New Brunswick. This run, however, extended into 300 miles or slightly more before we returned to Asbury Park, as on our way back from Lakewood we decided to run into New Brunswick and from there to Trenton, which we did.

I first went through the starting operations, but with no result, and after cranking for a few minutes I decided to take up the floor boards and have a look at the

spark plug. The moment the boards were out of the way I saw the trouble. The wire leading to the spark points passes over the fan. A new wire had been put in that was rather long and this had sagged sufficiently to interfere with the fan, which at once cut through the insulation and severed the wire in two. Scraping the insulation from both ends of the wire, I joined them together and taped them. The motor resumed operations at the first turn of the crank.

RAN INTO A STORM.

A storm was coming up at the time, and after we had gone a few miles it broke in all its fury. We sought shelter under a shed and waited for it to clear. An hour later we were ready to start again, the storm having blown over. Going out and cranking the motor I found that it did not start and I at once surmised that possibly some water had reached the suction screen and got down into the carburetor. As it was only a minute's work to take this off I decided to do so, and after emptying all the gasoline out of it, I put it back into place again. In my hurry to get away I rushed things, and after getting the gasoline pipes connected again, I turned over the motor, but there was no sign of an explosion. I spent the next half hour in going over all the wire connections in the wagon, cleaning the spark plug and changing to a new set of batteries, but all to no avail.

Finally I decided to get under the machine and have a look at the carburetor from below, and after doing this I was willing to pay someone to kick me. In my hurry to get the carburetor on I had allowed the pipe, or nose, to miss the hole intended to receive it and this had slid past. Of course, no gasoline was sucked into the cylinder and there were no explosions. After taking off the carburetor and replacing it properly the motor started easily, and we were off again.

Another puncture, this time in the left front tire, and the consequent delay of repairing the inner tube, was the only incident on the run to New Brunswick. After lunch we started back to Old Bridge and on to Lakewood and went as far as Farmingdale without incident. While going up a grade on the outskirts of the town there was a sudden snapping noise and the motor stopped "moting." After setting the emergency brake I got out to hunt for trouble. Upon turning over the motor I found there was no compression and an inspection of the valves showed that the small key ring connecting the end of the exhaust valve with the rocker arm and spring had broken and the valve would open, but would not close.

(To be concluded.)

A novel excuse for speeding an automobile was offered in the Evanston Police Court recently. The defendant said that he was on his way to church, and that he was late.

A Week in a Runabout.

By S. H. ROUS.

Having the week of August 8, 1903, to spare from business, my wife and I determined to spend it in our 4½ horse power gasoline runabout. So after fitting a hamper on the rear deck with bolts, and packing it with a week's necessities, not forgetting our alcohol stove and coffee outfit, we pushed our steed on and off the Camden ferryboat (when will this nonsensical rule be abolished?) and started down Federal street on the asphalt in fine spirits.

The asphalt very soon ended, however, and a very poor road was encountered, very much filled up with trolley tracks. Here the advantage of a standard tread was apparent, as we ran on the tracks for several miles and bowled along as smoothly as could be wished. The machine kept in the tracks without an effort.

Wishing to get to the coast as soon as possible, we decided not to go by the familiar Philadelphia-Asbury Park route via Freehold, but went to New Egypt, intending to go from there to Toms River, which nearly proved our undoing. One mile before reaching New Egypt we came to a pleasant country hotel, where we determined to remain over night. We were well taken care of and no charge made for stabling our machine. The landlord's wife has a magnificent specimen of a night blooming cereus which is well worth the inspection of any ladies who may pass here on the way to Lakewood.

The next morning we inquired as to the direct road to Toms River via Lakehurst. As is usual with natives, they were in doubt as to its condition, but thought it was "putty fair." Fair! I wonder what they would call bad. Talk about the difficulties of transcontinental tourists in the Great American Desert—the New Jersey desert is enough for us! Seventeen miles of deep sand through scrub pine, no water, not a house or a living creature for 12 miles and countless millions of mosquitoes! Having once fairly started, we were ashamed to go back, and determined to make Toms River or bust!

Sand trails led off in all directions, looking just like the main road, so that it was a puzzle to know whether we were going right or not. The sand became so deep that we were forced to go on the low gear continually, and I was obliged to push while my wife held down the speeder. The water tank became almost exhausted and matters became serious. We were obliged to stop every half mile to allow the water to cool, which meant a continual battle with the mosquitoes. Our tank finally ran dry, and there we were stuck in the desert 6 miles from the nearest house! After a discussion as to whether we could fill the tank with huckleberry juice, in desperation I went ahead a few hundred feet, and to my joy I found a pool of stagnant and brackish water which was about half mud, but which I determined to use in some way. We managed

to get our machine as far as the pool, and then after an hour's hard work filled the tank by straining the water through several thicknesses of cloth. Emptying out two gasoline cans of our surplus stock we filled those with the doubtful liquid, not knowing what would happen to us in the next 6 miles.

Well, it took the last drop we had to reach the nearest well on the outskirts of Lakehurst. The first native who saw us coming out of the pine belt opened his eyes and mouth, and finally said: "Whar on earth did you come from?" When I said, "New Egypt," the gentleman remarked: "Well, I swan! That's the first one o' them things that ever went over thar sand trail," which made us feel rather proud of our trusty runabout.

The fine road from Lakehurst to Toms River was greatly appreciated after our experience of the morning. We spent that night in Island Heights and there I met the only unsociable motor car owner in all my experience. This surly young man refused to enter into conversation and actually turned his back on us. Later in the evening he insisted on having a tarpaulin removed from our hamper, saying that it belonged to him, and which the landlord had spread over it because our machine stood in the yard all night without shelter and the gentleman had a warm, dry house for his own machine! I mention this case because I am happy to say it is quite the exception. Automobilers are invariably generous and more than willing to help out a brother in any way.

With the exception of 3 miles beyond Toms River, which is sandy, our drive up the coast was delightful. We ran out to the beach at Point Pleasant and had a sea bath, resuming our journey much refreshed. After spending a day at Asbury pleasantly (with the exception of the moment when we paid \$1 for storage over night at the garage, without cleaning,) we started for Atlantic Highlands. We had only gone a few miles when it began to rain and for an hour it poured down like a cloudburst. We put up our curtains and kept dry, and our little machine plowed along, sometimes through 6 inches of water, without missing an explosion. We ran into Pleasure Bay for dinner; then after the rain had ceased continued through the Highlands over fine roads to Red Bank. Then followed a delightful run through New Brunswick, Metuchen, Plainfield, Scotch Plains, the Oranges, Montclair, to our old home, just over first Watchung Mountain, on the famous Pompton Turnpike.

After a day's visit we retraced our route to New Brunswick and then to Trenton. Our buzzer here began to jar out of adjustment, and when this particular thing happens it is most aggravating, as it keeps on occurring every few miles. At the garage in Trenton we were well treated—given storage and a fine cleaning of an extremely muddy machine for 50 cents.

Hearing such bad reports of the Trenton-Philadelphia route through Pennsylvania, we went via the New Jersey route and found it almost perfect, until we reached the edge of Camden, where we struck the most awful cobblestone street with two trolley tracks, and the worst of it was the trolley line was not standard tread, so that one wheel was on the cobbles. We had 2 miles of this, and it was awful; but we finally got onto Market street and the asphalt. Another push on the ferryboat (and at high tide this is no joke) and we were back in Philadelphia, after a delightful tour of 350 miles and some rather trying experiences. But, as my wife says, "If we had not struck some poor roads we wouldn't appreciate the good ones half so much"; which is true philosophy.

I wish to say in conclusion that the cooling system of my runabout is not very satisfactory; it is necessary to take on water after to miles at full speed on high gear. If some steep hills are encountered I must take water every five miles or get an extremely hot engine.

In 1,000 miles, however, I have not been bothered home, my repair bill is less than \$5, batteries are still doing doing, and my double tube tires have had no attention whatever, except pumping up about four times. So I presume I have no cause for complaint. My machine is certainly costing me much less than an old plug of a pony and a cart I used to keep!

Chas. J. Glidden's Tour Into the Arctic Circle.

Charles J. Glidden, of Boston, Mass., who last year made a very successful automobile tour of 3,800 miles through France, Germany and Switzerland, is now making a trip through Sweden. This year's trip, which is made in a 16 horse power Napier car, started at Boston, and 6 miles were covered on American territory before the car was loaded on to the steamer. Mr. Glidden then drove through England (155 miles), and from there shipped the car to Denmark. The 118 miles drive in Zealand, Denmark, through almost continuous parks and grain fields was only marred by one incident. A great many roads leading to the castles are closed to motor cars, and Mr. Glidden, unawares, turned into a forbidden way for 100 feet, upon which was located the railroad station, and was immediately arrested and fined by the officer making the arrest 20 kroners (\$5). Immediately driving to police headquarters, he stated his case and received a paper that will entitle him to a refund of the amount through the Copenhagen office.

The drive in Sweden began Friday morning, July 31, from Helsingborg, and was continued via Jonköping, Skillingaröd and Grenna to Stockholm, which was reached on August 3. The roads in general compared well with average American roads.

In the Mountains of Western Pennsylvania.

By E. P. HODGES.

My experience with tires, as described in my last communication to THE HORSELESS AGE, influenced me to lay in two extra outer and inner tubes, without which one would be quite helpless in this region where machine shops and auto stations are unknown.

Undaunted by our last sad tour, we started on the 3d of July on a 25 mile run into the Cheat River Gorge, the objective point being Mont Chateau Hotel, lying in a cleft of the savagely wild valley, and only accessible by horse or motor vehicles, of which not a few go there from Morgantown and Uniontown, Pa., the latter being 20 miles to the northeast.

We put on our dos-à-dos seat and let down our 4 foot drag behind, as this serves to catch the ground and stop the car when we stop on a steep hill and the band brake becomes useless, which, by the way, is very often the case. The infant, his Mexican nurse, and a male servant to turn the crank when occasion demanded, occupied this rear seat. The day was a typically hot one, and the 76° gasoline seemed to ooze through the copper tank, so fierce were the sun rays.

After oiling up carefully, testing all the bolts (as I always do before taking a run), and assuring ourselves that the water and gasoline tanks were full, we started out of our farm lane, and up the very steep short hill which began the journey. We were half way up when the motor slowed down and stopped. The band brake slipped, as usual, and our only salvation proved to be the forked iron drag, which brought the car to a standstill with a jerk, the front wheels rearing up from the impact. The dos-à-dos load disembarked, we tried it again, and pulled up nobly. For a mile farther we met a succession of hills, and had to use the hill climbing clutch frequently to get to the top, the young man walking most of the way.

At last on top of the lofty hills, we took all four passengers aboard and sped away over the yellow clay road which wound undulatingly over the green pastured hills of the prettiest corner in Pennsylvania. To the left we could see the savage silhouette of many rolling spurs of the Blue Ridge, dim and blue in the distance. To the right, and, in fact, all around us, were the green, smiling farms nestling in the valleys. The whitewashed frame houses looked so very inviting amid their setting of apple trees and fields of waving corn that we were quite charmed with the view.

We rolled along at a 15 mile gait, the motor chugging along regularly and the tires holding up nobly. Every level stretch I turned on full speed, as the hotel was still somewhere in the distant valley or gorge from where the black waters of the Cheat so silently emerged. We surmounted numerous hills with no stoppages, and so well did the little runabout travel that

we all were loud in the praises of the man who had put together so useful an outfit.

When we came to a level strip of road passing through a wood of noble forest oaks I opened the throttle and advanced the spark to the limit, and ahead we shot like an arrow from a bow.

About this time I noticed that the steering lever did not respond very promptly, and careful from the responsibility of carrying such a heavy load, I at once applied the brake and reverse lever. It was well that I acted so promptly, because the car wandered into the fence corner and stopped just as the steering gear became totally useless. Upon examination the cause of the mishap was seen to be the complete separation of the steel pin which fits into the centre of the front axle and the lower end of the steering bar. This pin had sprung completely out of the socket, leaving the forward spring resting upon the edge of the axle, upon the verge of falling to the ground with the front end of the car. Had this occurred while running over a rough road we would undoubtedly all have been badly injured.

A passing traveler in a hay motor car kindly helped us to lift the pin back into its proper resting place. As there was no means of keeping this pin from repeating its dangerous performance, I compromised by tying a piece of iron wire around the spring, which wire, by the way, is still doing service. We got under the pleasant shade of the trees and had a rest, tempered by some very cool spring water which gushed out of a moss grown rock across the road.

The road from here on is known as the Uniontown pike, and is kept in good repair in summer by means of road ploughs and scrapers, which are the proper thing on a clay road. At 11 a. m., two hours after setting out, we passed through Easton, a quaint hamlet, consisting of two grocery stores, a flour mill and ten small houses. One sickly looking man sat upon a dry goods box in front of the nearest store, unconcernedly whittling a stick. As four chickens flew out from under our fast revolving wheels he looked up listlessly and fell to whittling again. No other living creature hove in sight. This is my recollection of Easton, W. Va.

The road continued to be smooth and fairly level, and as the motor never missed an explosion we bowled along at a 20 mile speed, stopping every half dozen miles to fill our water tank at the roadside trough, hewn out of a whole log, and usually fed from a wooden canal which led the water from some mysterious place back among the mossy rocks. We always used a funnel and strainer to do this water filling, as the dregs and mossy filaments do the water circulating system no good.

Running down a hill I took the Porto Rican servant up beside me, and told him to take the steering lever, which, I am sorry to say, he did, for no sooner did he have it in hand than the front wheels be-

gan to wobble and then turned at right angles into a fence. I applied the brake and clutch at once, but too late to avoid disaster. We struck a stout locust post with a loud crash, knocking three panels on boards off the fence, and at the same time putting an ugly hole through the wooden front of the dashboard. Fortunately, nobody was hurt, nor was the machinery or the axle damaged. After this we proceeded more carefully, and the young man retired to his former seat on the "dos-a-dos," a sadder but wiser man.

As we approached the crest of the mountain overlooking the Cheat River gorge, we could see the hotel down below like a yellow pearl in a setting of blooming rhododendrons. Here and there the gaunt spruce pines reared their heads formidably above the surrounding verdure. We were afraid to descend the unknown incline, as the road promised the unexpected. A passerby, in answer to our query, said that the hill near the suspension bridge was a "terror," so in unpleasant anticipation we sent the rest of the family down ahead as a scouting party. I kept the car well in check by means of the clutch and brake, and so descended safely.

Once over the bridge, all was plain running to the hotel, half a mile distant, where we drew up before the doors and caused a mild flutter of excitement among the dozen "city guests" who had until now thought themselves buried in the heart of the inaccessible Blue Ridge, where telegraph and motor cars were unknown quantities. We had a cool draught of—let us call it water—and the ladies and gentlemen surrounded us, curious to know how we had fared on so difficult a journey, where machine shops and "garages" could not rescue us.

Here, while the rest of our party were recounting their experiences, I wisely employed my time going over all the

bolts and bearings—oiling here and tightening there, putting in a few drops of oil in a dry bearing which my car had been quick to distinguish. The crank case end of the connecting rod had begun to knock, so I took off the hand hole plate, which for a wonder was accessible, and tightened up both ends to make doubly sure.

The knocking continued, so I laboriously took out the strip in the bearing, filed it thinner, and thus allowed the bearing to be screwed more tightly. This "taking up lost motion" I had learned before as engineer of my steam launch, and I do not know a bit of repairing about an engine which requires more nicety of adjustment than this.

Finally we got all in order, and returned over the road winding down the right bank of the river. The latter half of it was full of deep ruts and sticky black mud, which tried my driving judgment to the utmost. To avoid one rut meant to sink the wheels on the other side up to the hubs. Often we got out and put in stones and clay with a shovel, on top of which we arranged old chestnut fence rails. At 4 p. m. we reached home, all covered with spots of parti-colored mud, but with the engine and tires intact.

My advice to beginners is to always keep their ears open for strange sounds from the motor, and if anything seems wrong to dismount and correct the fault or remedy it as best they can until permanent repairs can be effected. Carry plenty of good lubricants and use good judgment when you meet a timid horse.

Motor propelled fire engines are now in use in three German cities—Hannover, Dresden, Berlin—and a fourth, Charlottenburg, has just decided to adopt motor propulsion in connection with its fire fighting equipment.

Vacation Tours in Ohio.

By DR. C. R. PONTIUS.

When we hear of tourists being in our city we generally picture in our minds a fine car with tonneau, brass mountings, four large and powerful lamps and a squawker, and carrying anywhere from a 15 to 40 horse power engine—a fine turnout. I would like to own one myself and spend a month every summer touring this beautiful country of ours, and perhaps a portion of the winter in Cuba. All tourists, however, are not using large cars. A few days ago I looked out of my office window and beheld three 1903 gasoline runabouts conveying six young men on pleasure bent, bound to have a happy vacation week.

I have but one auto, my first and only, purchased for business and pleasure. It is provided with a top to protect me from storm and excessive heat, and is sufficiently powerful to carry, with careful driving, as many as can find room. Once recently the number was eight lasses (not all mine) and myself. Four, however, is the limit for comfort and for the engine to pull over a long distance, at a rate of speed varying from 12 to 25 miles per hour, depending on the condition of the roads encountered. An average of a little better than 16 miles per hour running time was made for a distance of 543 miles, completed July 14 last, which is certainly fast enough on rough American roads, particularly if the operator is to view the country as the miles are wheeled off.

I operate a gasoline phaeton of 1901 type, delivered to me new in April—new, yes, everything was new to me. I had not practical experience enough to know what a sparking plug was, let alone the difference between a make and break and jump spark. Under these conditions of ignorance of the technical construction of my car I assumed control of the levers. I had read *THE HORSELESS AGE* for one year previous to this time, and knew something of a gasoline engine, but had no practical experience.

During the last two years I have made a number of more or less extended tours, the shortest being of 200 miles and the longest of 543 miles. The number of passengers carried varied from two to four. My first long trip of 200 miles was undertaken four months after receiving my machine, in company with a genial friend, a druggist and member of the L. A. W., who was in the habit of riding about 5,000 miles annually on his bicycle.

We left our city at 3:45 p. m., expecting to cover 94 miles before seeking sleep, which we did, but did not get to rest until a little after midnight. We stopped for supper at Elyria. We added water to the tank when needed and stopped a number of times to replace broken wires connecting the battery cells—two things I find unnecessary to do very often, as I now have things arranged. We had never traversed



IN BROOKSIDE PARK, CLEVELAND.

the road before, consequently were compelled to inquire the way occasionally. We found people good natured and generally obliging, and greatly interested in my auto. I observed, however, that few asked me any questions about the machine, but learned afterward that the reason was that my friend, the druggist, was regarded as the owner and I as his chauffeur. This assumption was perhaps natural, because I looked after as well as drove the machine and was on that account more or less dirty, and perhaps lacked the nabob appearance of my friend.

Our destination reached, we had some difficulty in getting storage accommodation for the machine in a livery stable, owing to having gasoline aboard. Sleep was welcome to two tired and dusty travelers. Three days were spent in Cleveland, and having some business matters to attend to we were unable to start home until 4 p. m. Knowing we would not arrive home until late I wired my wife: "We're off; both sober." We were well on our way when we struck to miles of deep sand, which we avoided in going to Cleveland. A hot eccentric called loudly for grease, and after locating the source of the squeaking noise, we found that the oil pipe that conveys lubricant to that particular bearing had in some way become displaced.

A little farther along we noticed that the water was boiling more than usual, and the engine labored very hard. Upon investigation we found that we had lost the leather belt that drives the rotary pump. Wanting to put my friend to some use, I sent him back to find the belt, but he failed to do so. I did not have an extra one with me, and consequently, as "necessity is the mother of invention," I concluded to improvise one. I went to a nearby house, occupied by a German who could not understand English any better than I could German, and had much trouble in getting him to understand that I wanted a piece of his clothes line. I finally got a piece long enough to answer my purpose, wrapped the ends carefully with fine wire, placed the improvised belt in position and fastened the ends together in the usual way. That belt did good service and is still hanging in my barn.

We reached Elyria by sundown and lighted our acetylene lamps. My friend understood the lamps quite well, and he agreed to give me the light if I agreed to give him a show of speed. The next 30 miles we covered in just one hour and ten minutes. My machine never worked better.

Our trouble commenced, however, when within 20 miles of home. I noticed the engine miss-firing very badly, so I stopped and went through the wiring, expecting to find a wire broken in two, but found everything O. K. in every particular. The carburetor was all right, and the gasoline feed was adjusted according to instructions. We got home soon after midnight.

The next day I removed the plug closing the peephole in the end of the cylinder, and



VIEW IN A CLEVELAND PARK.

had my man turn the engine over repeatedly, after which I could see the spark whenever the points separated. So I knew—yes, positively knew—the trouble was not in the spark, yet I failed absolutely to improve the condition. Cleaning the sparking plug points and everything I could think of did no good.

Having arranged to start on a 300 mile run with my wife and two little girls in a few days, I was anxious to have everything in good running order, and I therefore wired the factory for a man. He arrived in the evening, and after I gave him the symptoms we adjourned to the barn, when it was already quite dark. In about three minutes he had the engine running perfectly. Did he laugh at me? I should say he did, and others laughed also, for he told the joke at the automobile show in Chicago.

"What was the trouble?" Well, I learned the difference between an ordinary spark and a snappy spark—between a good spark in the open air and in a chamber of compressed air. Testing batteries, cleaning spark plugs and points, changing mixture did no good, but when Mr. Halstead, the factory man, adjusted the sparking device so that the points would come in contact more firmly and operate more readily, the trouble was remedied. Paying \$11 to have a nut tightened seemed considerable, but it was a lesson that had to be learned, and as I am in the habit of paying for my education, this was no exception, but I assured Mr. H. that he would never be called again for a like purpose.

Two days after this experience we started on our 300 mile run. Mrs. Pontius, one little girl and myself on the main seat, my other daughter on a child's seat in front. The girls changed places about every 20 miles, to avoid fatigue as much as possible.

We had traveled about 25 miles over very dusty roads and some heavy sand, when the engine began to show much less power. I allowed the engine to struggle along for

a while, but it kept getting worse, and finally I found it necessary to use the low gear in order to move at all. "What's the matter now?" my wife asked. How often I heard that question during my first year's experience! Brother operator, have you ever heard a similar remark? My answer usually was, in substance, "I do not know, but I will investigate."

The child's seat removed, I went after the batteries, presuming, as usual, a cable had about wiggled in two, but found everything in order. Changing from one battery to the other did not help matters any. I was puzzled, until I noticed the screen over the end of the air intake pipe was thickly covered with dust, permitting only a very small amount of air to enter. This resulted in a poor mixture, followed by a weak explosion, affording but little power. A little gasoline from the drainage cock soon washed off the dirt so the engine could breathe again, when it showed as much life as ever.

We stopped at every county seat to add water and look over the machine, for it was very hot weather. We never failed to draw a crowd of curious people, equal to that which we often see surrounding a patent medicine vendor. I like it, as it gives one a chance to come in close contact with humanity.

A laughable incident occurred between Delaware and Columbus, where a new electric railroad was being graded. Colored men with mule teams attached to scrapers on wheels were finishing a grade about 25 feet high. When the drivers saw us approaching at a good rate of speed they frantically tried to get their teams out of our way. Scared at our approach, some mules went backward, some forward, and finally some decided to go up the steep grade. The drivers could do but little with them, and some jumped into the scrapers, thus keeping up with their teams. Where so many teams were working and

all seeking to give us the right of way at the same time it made an amusing sight from our point of view.

The belt that drives the rotary pump caused more delay on my trip than anything else; it would come off and get lost two or three times every day, a difficulty I have now remedied, and I have rarely occasion to think of the belt any more.

A week was spent at my boyhood home with my father and others—a most enjoyable visit, long to be remembered. How pleasant to visit the scenes of one's childhood!

One morning bright and early we said adieu to our friends and started for our Northern home. In Columbus the belt disappeared again, and I had to draw on the reserve stock of belts, which I had learned to carry with me. Everything was lovely—the sun bright and the air pure, fresh and free from dust. How nice it is to go spinning in an auto early in the morning about 6 feet above Mother Earth, expanding one's lungs with pure air (one of the greatest of God's blessings), with the entire family aboard, well and happy, and enjoying natural scenery as the miles are reeled off.

Everything was serene until we reached Worthington, a village 9 miles from Columbus, when one of the traction tires burst—a nice predicament to be in too miles from home, and without an extra tire, and one in which only a tenderfoot could be caught. Investigation revealed a hole in the side of the tire 1 inch long, at a point where some days before I had observed a blister, but which I had not given any consideration. It pays to attend to blister symptoms, as I have since learned. I plugged the hole with rubber tubing, rubber bands and jiffoid the best I could; over all I used surgeon's plaster and bicycle tape, and finally wound rope around the injured section of the tire. I then placed about a half gallon of water in the tire and was glad it held quite well, but not perfectly.

My enthusiasm over the repair was not

very great, because I felt sure the period of usefulness of the tire was about over, and so I was not surprised when the final collapse came, a few miles north of Washington. We had no choice as to what we should do. We simply had to run to Delaware, a distance of 8 miles, on a perfectly flat tire—a ride, my wife said, resembling riding on a log wagon, an experience which I doubt she ever had. The flat tire was on her side.

After a slow run we reached Delaware, and 'phoned the factory for a new tire, which arrived and was placed on the wheel by 10:30 p. m. In the meantime we put up at a good hotel, taking things philosophically, regarding it as an extension of our vacation, and continuing to have a good time.

It rained all night, but ceased at daylight, and at 6 a. m. we left Delaware for Marion, 20 miles away, over fine gravel roads which the previous night's rain had not injured to any extent. In one hour and three minutes after leaving Delaware we stopped in Marion for breakfast. A few miles out of Delaware a farmer was driving his horses from the pasture, and one fine fellow saw fit to have a race, and entered the road about 100 yards ahead of the machine, head and tail up, beckoning us to come on by tossing his head, and throwing his compliments at us in bits of wet gravel. The chase was interesting to us all the time, but to the horse apparently only for the first mile, for after that he seemed to be looking for some graceful way to withdraw from the race, as his wind was hard'y equal to that of the monster following him so closely. Finally we came to a side road, into which the horse made his escape.

The remainder of this trip was uneventful. Owing to the bursting of the tire, we arrived home nearly a day later than we expected, and my friend, the druggist, mentioned early in this article who is somewhat of a joker, thought he would have some fun, and posted a card on my barn door which met my eyes when I

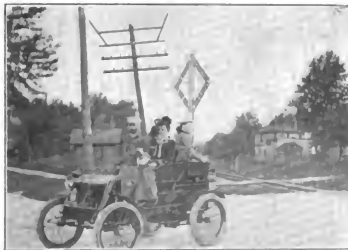
stopped: "Wanted! A good stout team to pull me home."

We have just completed another trip over the same road as two years ago and farther down into Ohio, covering 543 miles instead of 300, as on the first trip. Our girls have grown so much in the two years that I found it necessary to provide more room for them, and had a dos-à-dos made, which proved quite comfortable, and now the auto can carry four with ease. Placing the extra seat on the rear of the carriage prevented radiation of heat from the old style of radiator, so I removed the old radiator and placed a new one under the dash, where it properly belongs, which renders most efficient service.

Last spring I added a muffler cut out; one year ago a spark advancer and a globe valve in the air line with a key running to near where I usually have my right hand, and I use this valve most of the time, rather than the foot button, thus giving the engine a regular feed of gasoline, and I find it much easier on me. I regard the five additions named as great improvements, and would not operate without them. On my recent trip our average speed for the actual running time was a little better than 16 miles per hour. I used the low gear not more than three or four times, which was on hills between here and Columbus, a distance of 113 miles. Our speed was fast enough for pleasure; our engine powerful enough to negotiate all grades; our carriage strong enough to carry the load—what more did we need?

The successful operation of a car depends on its condition. I keep my ear in the pink of condition, and often hear comments as to how quietly it operates, what power it develops and how nicely it runs. However, in order to keep it that way it must be looked after.

I take care of my auto myself, and have made it a careful study—taken it apart and put it together more than once, and when anything is not working satisfactorily I locate it without much difficulty and fix it. My family go out for a spin quite often.



DR. PONTIUS AND FAMILY STARTING ON THEIR FIVE HUNDRED AND FORTY-THREE MILE RUN.



ARRIVAL AT DELAWARE AFTER A NINETY MILE TRIP ON A HOT DAY.

and instead of going 6 to 10 miles, as we used to do with horses, we go 10, 20 and 30 miles and think nothing of it. How we do enjoy it!

My radiator has 42½ feet of pipe, which is quite ample, and I have made a continuous run of 125 miles on a hot day without adding any water after starting. In order to enjoy a trip, a machine must be in good condition, and above all the operator must be thoroughly familiar with it; he must be able to take apart and re-assemble all parts, set all valves correctly, grind them in their seats if they leak, and be able to do anything in the way of adjusting that may be necessary. I have reached this stage in the care of my machine, and feel perfectly competent to care for it, not feeling as I did two years ago, that I was liable to be held up almost any time until a man from the factory a hundred miles away could come to my assistance.

I have comparatively little trouble with horses frightening; more, however by their drivers getting scared. Many times I have overtaken vehicles that the occupants left the carriage to hold the team when it was wholly unnecessary, the animals not leaving their tracks and evidently wondering what all the commotion was about. On my tour this summer, near Marion, Ohio, I was about to meet a carriage drawn by a large black horse and occupied by five women and several children, when a quarter of a mile away we observed ten palms (hands) waving us to stop, and soon the women were on the ground. I stopped my carriage and led the horse by—not at all a difficult task. I think horsemen as a rule are very careless in driving with loose lines, the whip in socket—the horse doing just as he pleases—the driver watching the auto with the keenest interest and liable to be thrown to the ground any moment. If you do not believe this, run a machine a while and watch drivers of horses. I should not use the term "horsemen," for I do not regard a careless driver as such.

A Vacation Tour in Southern Indiana and Illinois.

By P. B. FELLWOCK.

In all my traveling I have never derived so much pleasure, nor encountered so much adventure, as in a recent automobile tour, and I will now indulge in some additional pleasure by jotting down the numerous incidents and experiences of the trip.

My home being in Evansville, Ind., I had studied Cram's maps for several weeks previous, and had laid out what I thought to be the best route to my objective point, St. Paul, Ill., a little inland town 14 miles southeast of Vandalia. In laying out the route I decided upon Vincennes, Ind., for the first stopping place and base of supplies, and Olney, Ill., for the second, from where I hoped to reach my destination directly.

The return home was to be over the same route.

It was the occasion of my annual vacation, and I had ten days at my disposal to enjoy myself in as best I saw fit. I at once decided upon an automobile trip over the route mentioned, to visit some of my country cousins in old Fayette County, Illinois. My wife and baby took the train, and twelve year old Johnnie and myself mounted our gasoline runabout for the trip of 150 miles.

We left Evansville at 3 a. m. on Sunday,

June 21, having gotten everything ready for the start the evening before. We made a bee line for the old State road leading to Princeton, and all went well as long as we ran on paved streets and level roads, but after we encountered the hills, 5 miles from town, we had considerable trouble with the motor. The following 5 miles of the State road, while macadamized, is exceedingly hilly, some of the hills being very long. We were running in a dense fog, which greatly reduced the power of the motor. Fog is very detrimental to the operation of any gasoline engine, as the fine mist gets into the carburetor. The damper the atmosphere, the less gasoline is required for a correct mixture, and I found it necessary, therefore, to diminish the flow of gasoline.

At 6 o'clock we halted at Warrenton, 16 miles from Evansville, it having taken just three hours over those hills and through the valleys. We took fifteen minutes to talk to some friends and oil up, and then wheeled on toward Princeton. We encountered some more hills, but experienced no more trouble, as the atmosphere was getting lighter, and the roads around Princeton were reasonably level and in fine condition; so we made up lost time and arrived at the Court House Square, Princeton, when the clock struck 7, our cyclometer now registering 30 miles. After inquiry for the road, we left for our next stop, Patoka, 4 miles farther on. With good roads and a down grade, it was but a few moments till we had Patoka in the rear, and were bound for Hazelton, 8 miles beyond. Roads were not so good here, being made of clay and not much traveled, and as it had rained a few days before, they were rough, and we had to travel slowly. It was nearly 9 o'clock before we made Hazelton, where we crossed the White River by ferry.

But alas! our troubles should begin now aright. Had we heeded some off-hand advice we would never have tried to "bluff" that White River bottom sand with a 4



BIDDING FATHER AND THE OLD HOME GOOD-BYE AT THE END OF A TWO WEEKS' VACATION.

horse power runabout. It is only 16 miles from Hazelton to Vincennes, but I would not make the distance again for \$1 per mile. It seems as if nature had spilled here by accident sand that would have abundantly supplied the wants of seven States.

Our ferryman told us to avoid the left hand road as it was sandy; "the right hand road is the good one," he said. Well, we found sand in excess even on the right hand road. The wagon tracks here were 4 inches wider than our wheel tracks, and with one wheel in the rut, the other would be grinding through a sand ridge 4 inches wide and 6 inches deep. To leave the track meant to travel in veritable quicksand. At times our wheels would churn. However, we finally did get to Vincennes, at high noon, vowing never to return via the sand route.

After a hearty dinner we crossed the Wabash River bridge at 1:30, and struck out a due western course for Lawrenceville, Ill., 12 miles distant. We had been told that this road was fine, except for a little sand, but to our disappointment we had to "wade" through sand for about 8 miles. It was almost as bad as our former experience, but we ran into Lawrenceville at 3:30. Our gasoline supply running low, and it being Sunday and the stores closed, we managed to obtain some of the vital fluid from a town residence, after which we struck out for Olney, Ill., a distance of 21 miles, and these were slow, rough and weary miles. Owing to recent rains the roads had been badly cut up by traffic, and after they had again dried not much travel had taken place. Besides, we found this section exceedingly hilly, with no improved roads, but common yellow clay. At times I feared we would tear the machine to pieces. Once we lost our headlight, but a very accommodating farmer found it, whipped his team up and overtook us at a stop, and kindly handed the lamp back to us.

lar as possible before dark. The roads were in good condition, and it was fine driving, notwithstanding the many hills. It was dark when we passed through Parkersburg. Still bent on getting all there was of the day we proceeded. At an exceedingly steep hill the low gear clutch, being oil soaked, refused to perform its clutching duties, and the result was that the engine ran at a breakneck speed, while the carriage stopped and began to go backward by its weight. Stopping the engine, a brake and a boulder at the rear wheels soon put a stop to all this nonsense. We tightened up the low gear clutch, and the carriage then ascended the hill. Near West Salem we stopped at a farm house and were gladly accommodated for the night.

Next morning at 6 we made a dart for West Salem. We got too far south toward Albion before turning off, and as we aimed to cross the Wabash River at Mount Carmel we kept on toward Albion, which led us on to the worst road of the entire trip—hilly and rough beyond description. At times we would encounter apparently unsurmountable stretches of uphill roads, and it took us two hours to make 7 miles. We finally got to Albion, and had not been there for ten minutes when a reporter for a local paper approached us for an interview, and seeing an opportunity we gave vent to our opinion of his roads.

Without losing much time we turned eastward, spinning toward Mt. Carmel. With good roads we made splendid time. Meeting a Standard Oil Company tank wagon en route, we replenished our stock of gasoline, and safely got to Mt. Carmel at noon. It was awfully warm, and we much enjoyed dinner and refreshments. Another reporter bent on an interview approached us at our dinner table; my card and a few remarks soon satisfied him, and I suppose he stretched it to about two columns.

After dinner we proceeded to the Wabash River crossing, and just as we were going on the ferry I heard that gnawing click in the front wheel again. I realized it meant either an hour's delay or running the chances of being able to travel 40 miles with broken balls. I quickly decided to choose the former and drove along the river bank to an ice plant, where, with the assistance of the engineer and fireman, I took the wheel off, and as good luck would have it we had just the number of balls left to replace all the broken ones. At 2 p. m. we were on the ferry crossing to the Indiana side. On landing we lit out for Princeton, 11 miles ahead, and with fairly good roads got there at 3. After refreshing ourselves and our faithful steed we made a bee line for the State road, bound for Evansville, just 30 miles. Near Princeton the roads were improved, but further on we had clay roads, and going at a happy gait we were leaving a cloud of dust behind us twirling upward from our trail.

At Warrentown we were met by a friend

who had been looking for us rather anxiously. We made a rest of two hours, fully satisfying the urgent demands of the inner man, and at 6 started on our final run, and covered the last 16 miles without a hitch. We crossed the city limits of Evansville at a little after 7 p. m., having traveled just 360 miles on the trip, with an average speed of 9 miles an hour, over roads good, bad and indifferent.

While this is not much of a record for speed, it must be considered that it was made with an 800 pound runabout not intended for touring. An inventory of motor expenses for the entire trip is as follows:

Fifteen gallons gasoline, at 13½c.	\$2.02
Eighteen balls for front wheel.....	.20
Three bolts.....	.05
Eight rolls of tire tape.....	.40
Lubricating oil.....	.15
Batteries.....(about)	.75

Total \$3.57

This figures out to a fraction less than 1 cent a mile. Over city streets or good country roads the expense would be about one-third less.

My advice to anyone owning an auto is to make a touring trip—it is very instructive and pleasant. Since the above trip I have had considerably more confidence in my machine. It has eliminated that feeling of doubt when leaving for a spin, and made automobiling more pleasant and desirable.

An Historical Spot In Old Tennessee.

We reproduce herewith a photograph of the "Hermitage," the old home of President Andrew Jackson. The farm of several hundred acres, near the centre of which the mansion is located, is owned by

the State of Tennessee, and is also the site of the Confederate Soldiers' Home. It is situated about 14 miles east of Nashville.

In the photograph, at the right hand side near the house, may be seen the entrance to the rose garden in which, about 75 yards from the house, is the tomb of "Old Hickory," by whose side lies his wife. In the foreground is seen an old-time Southern negro, polite, respectful and dignified. It is Augustus Jackson, the son of Alfred Jackson, body servant to the President, and faithful servant to the day of Old Hickory's death. For the photograph we are indebted to John T. Landis, of Nashville.

Club Dissatisfied with New Law.

At a joint meeting of the club and legislative committees of the Automobile Club of Great Britain and Ireland held on August 10 the following resolution was unanimously passed, viz.: "That although the Automobile Club has favored and does favor any legitimate legislation which will prevent inconsiderate or dangerous driving of motor cars at excessive speeds, and consequently agreed to identification, the club still adheres to the opinion expressed by Mr. Long and supported by the County Council's Association and the majority of the chief constables, viz., that a specific limit of speed tends more to the public danger than to the public safety, and they are therefore opposed to a 20 mile per hour or any other specific speed limit, since it cannot fail to be vexatious and inefficient, and will undoubtedly seriously injure the automobile movement in this country, which if allowed free growth will undoubtedly, as in the case of the bicycle, lead to the evolution of vehicles suitable for general use by the professional and industrial classes."



"THE HERMITAGE."

line, but it being Sunday none could be had. Fortunately our supply purchased farther back was not exhausted, and we ventured on. It might be of interest to state that 5 gallons of gasoline cost us in one place \$1.35, which seemed rather high. We can recommend the fruit that grows along the road we followed, and I don't think better cherries were ever eaten. The road wound through some beautiful shady places, and it was refreshing to stop under a big tree and cool off after the hot sun had beaten on us for awhile.

But the shade finally passed, and it was time for a new experience—and it arrived on time to the minute. A small bridge had been removed across a small ravine, and a grass road cut around the opening. The grade down was very steep indeed, but one can always go down—the rub is in getting up. After starting up on the other side we found that the sand increased as we approached the top, and gradually the machine slowed down and stopped. Having gone that far, it evidently thought that it was entitled to another try and began to back, and no amount of coaxing would prevent its landing in a small bush, but fortunately it received no harm. When the steam gauge said 220 pounds, we pulled the throttle wide open, and with the help of a man behind we just barely pulled through the sand onto firm ground, when we breathed freely once more. There was a span of mules hitched to the fence at the foot of the hill, and as soon as they saw the machine they began to show signs of fright, but we dashed past them before they had time to make up their minds to concerted action on the fence, so no harm was done; besides, we rather counted on the mules for assistance in case of trouble with the sand, and we were afraid to stop for fear of not getting started again. After this the miles passed merrily behind till we arrived in the Suscol Hills.

Meanwhile the wind had continued to blow with great force, and it was with much difficulty that the pressure could be held up to 70 pounds; in fact, at times the pressure got as low as 30 pounds, but we kept crawling along. It was along here that the engine developed a new trick, one that it must have devoted some thought to, for it came near undoing us.

The crank on the left side of the engine was slipped on the shaft and held there by a big flat head screw threaded right handedly. Every time that the crank passed the centre the play in the joint moved the screw, and it worked loose. No matter how tight it was set up, it would be rattling in to rods, and all that could be done was to climb down and tighten it up and go on, which was repeated ad nauseam. Presently, after almost wearing me out, the trouble stopped of its own accord.

On one of our stops we were hailed by an old man who ran to the road and asked us to wait till he could examine the machine. He expressed great admiration for

it, and vowed he would have a car if he lived.

We now began the last of our hard climbs, and the hills became worse till finally one, the very worst, appalled us by its steepness. However, there could be no turning back, and as there was a buggy ahead upon which we might call in case of need, we allowed steam to get up and then took a run at the hill. Up we climbed till near the top, when the speed gradually slowed and—no, we did not stop, but we got out and helped, and thus arrived at the top without help from the hay motor. From there on the journey was pleasant, steam keeping up without trouble and the roads being excellent. Our trip terminated satisfactorily, and our opinion of the machine had improved considerably.

Now as to the lessons we learned. It seems that the chain on our machine was altogether too small, for, although it had given us but little trouble on this trip, it had broken several times before, once in the middle of a creek where we had to get out and wade around in the water with good clothes on—but that's another story.

There is a safety appliance that should be on all machines, and that is a rod which can be let down to prevent the machine from running away down hill in case the brake does not hold. It is a safeguard that would be worth its weight in gold at times.

Previously we had trouble with the tires on some very rough roads, and adopted the following plan to save punctures and wear on the tires. We got some old rubber belting and cut it into narrow strips the right width to wrap around the tires, but not quite close up on the rim. Then we cut little V shaped notches in the sides to admit the belting to follow the curve of the rim, and punched holes in the sides, and with belt lacings drew the coverings over the rim and pulled it up tight, placing the lacings behind the spokes so that creeping would be prevented by the lacing holding against the spokes. This belting protected the tread of the tire perfectly, and we have never had a puncture since applying it.

We also felt the need of a safe and convenient tank to carry extra gasoline in, though we did not think of a tank when we started. It seems to me that a change greatly to be desired is to have a satisfactory kerosene burner. Gasoline is not to be had everywhere, while coal oil is, and besides it seems that it would reduce running expenses. A crosshead air pump would be a great convenience and would save the operator much warm work to keep up pressure. An arrangement to prevent burning back would be desirable too, something that was made to work, not to sell.

As to the mileage per gallon of gasoline, we measured our gasoline and distance, and the best that we could do was 7 miles per gallon with the 1.400 pound rig we had. It has been stated that gasoline cars will average 12 miles per gallon and may run up to 20 miles. Should like to hear what the best steam record is.

Progress in Automobile Clothing.

By WILLIAM P. KENNEDY.

Up to the present there has been a hesitancy on the part of the automobiling public to adopt the costumes offered even by fashionable clothiers. This is due to the wide divergence from conventional modes in the styles presented, tending to make the wearer uncomfortably conspicuous. In some instances almost ridiculous. Happily these conditions have changed, and the alert manufacturer has come to a realization of the fact that he must handle this enterprise as any other commercial proposition, and devote to it considerable discretion and sound judgment. The automobilist can now without difficulty select from a very extended variety such apparel as will exactly suit the temperament of his fancy or the extent of his exchequer.

The size of one's machine, its value, or the use for which it is intended, must be the governing factor in considering the clothes to be worn. The owner of a number of machines must necessarily be provided with an assortment which will vary



LADIES' GARMENT.

in purpose as well as in price. A gentleman's touring costume is no more suitable for a city runabout than a lady's traveling dress would be appropriate for calling or shopping. In selecting an equipment therefore consideration must be given to the use intended for each article, as well as the comfort and convenience to be derived from it.

The purchaser will find that few details have been overlooked by the manufacturer, while it is quite evident that touring specialties have been given special consideration. A few universal articles are to be found which will serve either in the city or the country. Much attention has of late been given to the details of fit and finish which in the earlier stages of the art were grossly neglected. In leather goods this is particularly apparent, where not long

since the loose, clumsy fit, accompanied with harshness of finish and heavy linings, betokened horse harness rather than genteel attire. All this has, however, given way to soft, smooth, even development, which is pleasingly surprising, and which will tend to its much more prevalent use. With long robes either for gentleman or lady the upper portion is made to conform comfortably to the body, while the lower portion amply provides for ease in a sitting position.

The seasons have much to do with the tone, quality and material of the goods worn, and have taxed both the designer and the wearer in their selection. During the past summer there has been a predominance of the loose cool duster for gentlemen, and the long, all enshrouding light silk cloak for ladies. These have been in favor from the facility with which they could be discarded on dismounting from the machine, leaving the ordinary costume beneath free from the dust of travel. Suitable headgear has been a considerable problem both for lady and gentleman. The latter, finding it difficult to provide himself with something sufficiently distinguishing from his chauffeur, resorted to the use of the plain cloth golf cap or light yachting cap. The ladies having had little to choose from have worn seasonable millinery with the helping addition of an enveloping veil, protecting both the face and the hair from the effects of the wind and the dust.

The coming fall promises much variety with a range of novelty that will satisfy even the most fastidious. The prevailing fashions in ladies' walking costumes with lengthy coats readily lend themselves for use when automobiling. Many of these styles have large turned down collars, cuffs, belts and shoulder straps of contrasting material, and are occasionally equipped with a profusion of brass buttons. There are also long coats of rainproof silks fashioned for automobile use, with muffing caps to match. These are made in many colors, and in combination with tartan effects at the collar, yoke and cuffs. Caps in rainproof silk of color to match the

coat can also be had, with patent leather visor, and an enclosing curtain of silk at the back and sides to protect the hair.

Leather caps of ooze finish in steel gray, buff, dark brown, crimson or any other shade are to be much in vogue. These caps will prove a boon to the ladies, as they are large and light, the crown being made in quartered sections of sufficient amplitude to accommodate the present modes of coiffure. Numberless are the trifles and toilet conveniences offered for the fair automobilist, who may now have her puff box, mirror and watch combined in one case, or wear a leather belt from which are suspended a dozen trinkets. Long top boots in many shades of light leather can be had, or ordinary walking shoes worn in combination with ooze leggings of tone to suit the dress or cap. Gloves with or without gauntlets attached having perforated palms, and lace veils with large clear mica eye shields inserted, are also among the novelties.

Gentlemen will find much to choose from in the line of cloth goods which are made up in suits resembling those worn when riding or golfing. There are also long dusters of molair and cravenette in a variety of colors, with either driving or military collars, raglan pockets and wide shoulders. These coats are lined with colored flannels, and occasionally have collars and cuffs of soft leather. In leather clothing the range is very extended, on account of the many flexible skins now being worked into delicately shaded pliable clothing. Black leather has been almost entirely given over to the use of chauffeurs, leaving the owner the more expensive grades, in many tones of tan. Short coats are made in the regular single and double breasted styles, but the Norfolk pattern worn with knickerbockers or loose riding breeches, and high boots or leggings, are the more desirable. Leather suits of ooze finish in gray or tan shades are novelties. A rare luxury is to be had in a long Chesterfield coat reaching down to the shoe tops, made of the finest grade calf skin, with collar and cuffs of mink or

other delicate fur. This coat has waist belt, straps across the chest, raglan shoulders and pockets, and is very loose and roomy below the waist line. In the making of such a coat hundreds of skins are often selected from, to assure an even shade and texture throughout the various sections of the garment. With these coats are intended to be worn long leather boots reaching above the knee and lined with Russian or Persian lamb.

For winter service the French furriers have provided an almost infinite variety of luxuries, combining many rare and contrasting skins, to produce effects which are both striking and harmonious. Among these for gentlemen may be mentioned coats of mink fur lined with Russian colt skin; with collar, cuffs and trimmings of racoon, beaver, Persian lamb, tiger cat, wolf, goat or muskrat; coats of unpolished otter, with or without trimmings of the foregoing skins; coats for either lady or gentleman of Damascus cat trimmed with coon, squirrel, or Persian lamb; coats of molekin trimmed with ermine; of kittras trimmed with white broadtail; black lynx with white fur; and Persian lamb with long haired fisher fur. Many of these coats have linings of squirrel lock and squirrel's necks. Ladies in these coats can have either stock or shawl collars. For the ladies are also provided cloth garments, trimmed with mink to shade, and lined with squirrel, with or without hoods; also coats of all shades in leather.

Lap robes to suit fur clothing are usually finished in soft high grade dressed leather on one side, and on the other with natural racoon, Russian pony, wolf, wallaby, natural hair seal, Switzerland goat, mink tails, mottled cat, dog otter or Chinese badger. Gloves and gauntlets are made in seal, Persian lamb and all other furs. Ladies' gaiters are furnished in all short haired furs, with buttons or patent fasteners. Besides ooze finish leather caps, there are also, for ladies, toques of Russian or Persian lamb, lined with mink or sable, and having large flaps, which can be turned



VARIETY OF NEW AUTO STYLES.



AUTO FUR COAT.

up or down to form a protection for the hair.

Gentlemen desiring to wear their ordinary clothing beneath a suitable driving costume will find themselves provided for in loose leather fur lined overalls, and also garments made in a single piece which can be wrapped around the body in such a way as to snugly fit the figure. There is also a loose robe which slips on over the head, having a rubber band at the neck and waist belt, with which goes a combination cap and hood. This garment is made in light waterproof cloth, and is very serviceable in keeping out the dust or rain.

The Tour of the Dill Party.

An automobile tour that was given much prominence in the daily press was that of the Dill party, from East Orange, N. J., into the Maine woods during the latter part of July and the first part of August. The party included James B. Dill and his two daughters, and two chauffeurs, and the trip was made in three steam touring cars. One of the cars served as baggage car and was fairly loaded with spare tires, hampers, oil and gasoline cans, etc. To provide further against the emergency of running out of gasoline and being unable to renew the supply, cans of it were sent to various places in the sparsely settled portions of Maine.

It is said that the trip was made as the result of a wager at the A. C. A., and the tour was started upon from New York city Boston was reached on July 21 without any great difficulty, and on the 22d, at 1 p. m., the trip was resumed. Mr. Dill carried maps of the complete route, which led through the northern part of New Hampshire and then through the Maine woods to the Rangeley Lakes. On the first day after Boston was left Portsmouth, N. H., was made by way of the North Shore road, and from there the route led to North Conway and Colebrook. At Colebrook the difficulties of sparsely settled mountainous country began. The trip to the Rangeley Lakes was figured to require about a week's driving. Mr. Dill calculating on an average speed of 15 miles an hour. In an interview Mr. Dill said:

"We shall stop in the Rangeley lakes district till the first of September, and when we return we will probably come by another route. I am taking this trip to show that the best and most honest test for an automobile is not to run it over the macadam roads of New York city, or up the Hudson, or from New York to Boston, such as the manufacturers do, but to put them where they will have to stand work and show what they are good for."

M. Gustave Rives, who has successfully managed the successive annual automobile shows held under the auspices of the A. C. F. has been made an officer of the Legion of Honor.



MR. DILL IN HIS WHITE TOURING CAR.

Vienna's Prospective Auto Ordinance.

The local representation (aldermen) of the Thirteenth Vienna (Austria) District, Hietzing, has unanimously declared in favor of a set of most restrictive automobile regulations which are now being circulated among the other district representations. The reasons for the restrictions are explained as follows:

"Years ago complaints were made about the fast and careless riding of bicyclists, and many mishaps and accidents were caused. Since then the conditions have improved. But how insignificant are the dangers which accompany bicycling when compared with those due to automobiles. If we station ourselves in any of the frequented streets, we will not have to wait long until we see one of these infernal vehicles rushing along, blowing, hammering, rattling and moaning, the occupants of which, made unrecognizable by masks and laughable articles of dress, unconcerned regarding pedestrians, bicyclists and occupants of other vehicles, are hurrying toward their destination at a maddening speed. In case of an accident no one is able to overtake the madman and make him responsible. Has one the misfortune to meet several gasoline motors at short intervals, the discharged vapors also cause intense coughing spells and exercise a poisonous action on the breathing organs, not to speak of the dust stirred up and the mud thrown in all directions."

The rules decree that all automobiles must be free from noise and odors; a speed of 6 to 7½ miles per hour must not be exceeded; all cars must carry large numbers both in front and rear; all drivers must

pass an examination; women are not allowed to drive, etc.

The peculiar tone of the introduction to these legislative recommendations shows the Vienna aldermen to be less unbiased than they would be expected to be. It would be interesting to learn the reason why women are not to be allowed to drive automobiles.

Washington Police Equipped with Speedometers.

Major Sylvester, of the Washington (D. C.) force, has determined that in future cases in the police court where owners and operators of automobiles are arraigned on the charge of exceeding the speed limit there shall be no doubt in the mind of the court as to the accuracy of the testimony of the bicycle policemen who prefer the charges. The bicycle will therefore be equipped with speedometers, and to make sure of the accuracy of the instruments trials were made recently over a measured off stretch between Fifteenth street N. W. and E street and the entrance to the monument grounds. Seven policemen took part in the trials, their wheels being fitted with Jones' speedometers, and it is stated that the electric timing apparatus showed them to be of great accuracy.

The police of Oxford, England, on a recent festive occasion indulged in a speed guessing game, the speed being produced by a motor bicycle. The winner made a guess of 23 miles per hour, when the actual speed was 24 miles per hour.

COMMUNICATIONS.

Whitman's Transcontinental Tour.

OMAHA, Neb., August 23.

Editor HORSELESS AGE:

I enclose a few prints which tell the story of our trip through Nebraska last week. Six heavy rains in five days turned this flat country into a lake. We therefore took it as best we could, and stayed in three towns two days each. We made a few days' run in the mud, when we thought we should be drowned if we stopped longer. One day we made 16 miles in the morning on the slow speed, just to see how the thing worked, and we found out all right.

If we thought our letter to the mayor of New York from the mayor of San Francisco should be rushed, I am afraid we should have to put on paddle wheels. The

well, being bound up in a cake of dried adobe—not a nut can jar off or a tire cut.

L. L. WHITMAN.

Light Versus Heavy Cars.

Editor HORSELESS AGE:

In your issue of August 29 a user claims a very laughable advantage for heavy vehicles, viz., that adding a passenger does not increase the percentage of live to dead load so much as with a lighter vehicle. He is undoubtedly serious in this matter, so I take the liberty to call attention to the fact that the advantage is found in large horse power in proportion to the live load rather than in large weight of vehicle. A heavy vehicle requires a large motor, and a large motor will unquestionably handle an additional 20 per cent. of weight much better than a small motor will handle an additional 47 per cent., but this is no argument against a light vehicle. Much better results will be achieved from the same motor if a lightweight vehicle having no needless weight is driven by it. Designers

above named concerns would have adopted some other system. I have used it on both the vertical and horizontal motors; there is one point to which I wish to call attention, and that is that the oil must be gas engine oil of a high test and not the ordinary machine oil.

GEO. R. MORAN.

To Prevent Spark Plugs from Sooting.

CENTRALIA, Ill., August 24.

Editor HORSELESS AGE:

About a year ago my partner noticed in THE HORSELESS AGE a suggestion that a short nipple between the cylinder and the spark plug would partly overcome the difficulty of dirty plugs. We had no room for a nipple, but we put in a steel L in such a way as to make the plug stand upright. We have never had a dirty spark plug since putting in this steel L. A common L and a short nipple would answer the purpose. I hope automobile users will try this and quit complaining about trouble with dirty spark plugs. H. T. C.



HAMMOND "LOOKING FOR TROUBLE" IN NEBRASKA.



IN THE PLATTE RIVER.



WHITMAN SOUNDING BOTTOM WITH A FENCE RAIL.

mud was awful. You would ride into a slough without a jar, the same as on feathers; then, as you settled deeper and deeper, the wheels would bring up tons of mud, and when the axles got over two feet under, the hind wheels spinning like a circular saw, and the mud flying in a stream on each side 40 feet high, it was about time to throw out the clutch and take your bearings. High ground could generally be seen in the distance. Then we would light up our cigars and argue the case, but in the end we managed to get out and rush away, anxious to get into the next mud puddle just over the next roll in the prairie.

All roads are on section lines, a mile apart; the mud holes seem to be much nearer, but our cyclometer was out of sight, and we simply went by our feelings. If you are a hard worked city man and want recreation, take your automobile and hurry out here in Nebraska, and as I am sure we shall be here when you come, I shall put you on to a few good things in this line. Our machine is holding together

as yet have not secured the most efficient proportions. The mechanism should not only be powerful, but light, while the shock receiving parts, such as wheels, tires, springs, axles and bearings, must be amply strong and of large size.

C. E. DURVEA.

Splash Lubrication in Two Cycle Motors.

NEW YORK, August 29.

Editor HORSELESS AGE:

For the past ten years I have made a close study of both two and four cycle motors and have used splash lubrication in both types; it is also used by the following companies, manufacturing two cycle motors: Lozier, Howard (Grant-Ferris), Palmer, Leighton, Gray, Clifton, Smeeckm, Dutton, Rochester, Wolverine, Superior, Hubbard, Smalley, and many others.

If the motor is properly designed and carefully built there is no doubt but that the splash system of lubrication will do its work and do it properly; otherwise the

In the Market for Steam Trucks.

CHRISTIANIA, August 6.

Editor HORSELESS AGE:

I am glad to inform you that in reply to my letter which appeared in a recent issue of your journal I got all the necessary information with regard to motor vehicles on rails. I have now an inquiry for a steam wagon for carrying 5,000 kilograms (5 tons) of grain, and which must be guaranteed to maintain a speed of 4 to 5 miles on a 6 per cent. grade when fully loaded. If the first vehicle should give satisfactory results the same firm will purchase nine similar trucks and several smaller ones. The fuel consumption, etc., must be fully guaranteed, and the trucks must be delivered f. o. b. liner in New York in running order. F. HORTH.

The municipal government of St. Petersburg, Russia, has decided to invest 6,000 roubles in three automobiles for its messenger service. At present it pays 200 roubles rent per month for one machine.



Fire destroyed the automobile shop of Thomas Rickett at Niles, Mich., on August 23.

"Red Devil" and "999" have been entered in the automobile races to be held at Milwaukee, Wis., on September 9.

The N. A. A. M. has issued its Bulletin No. 10, which relates to "Unconstitutional Features of the Bailey Law."

Marysville, Ia., is to have an automobile club, which it is expected when fully organized will have about ten members.

E. V. Earl, of Boston, is demonstrating in New England cities the twelve passenger touring car of the Chicago Motor Vehicle Company.

It is stated that the Anheuser-Busch Brewing Company, of St. Louis, Mo., is about to replace its horses with an automobile delivery system.

Terrence D. Wilkin, president of the Syracuse (N. Y.) Automobile Club since its organization, died from a shock of paralysis on August 18.

The L. H. Ramsey Sign Painting Company, of Lexington, Ky., has just received a 40 horse power automobile, which is fitted with special appliances.

J. W. Skene has in his shop at Lewiston an auto of home made design and construction to be used in selling refreshments at the Maline State Fair.

A committee, composed of Louis Eising, H. A. King and Samuel Herzog is arranging for an automobile parade from Edgemere to Freeport, N. Y., and return.

The Automobile Equipment Company, of Indianapolis, Ind., will remove to Detroit, Mich., where a lease of the four story building at 251 Jefferson avenue has been taken.

The factory of the Searchmont Automobile Company, at Chester, Pa., has been started up again after having been shut down for about a week for stock taking purposes.

The horse Crescens on August 27, at Dayton, Ohio, established a new world's record of 2:08 $\frac{1}{4}$ for a half mile track. He was paced by a White touring car, driven by E. C. Denzer.

J. Murray is building in the workshop of J. J. Murray, at Cleveland, Ohio, an auto bus 22 feet in length and capable of developing a speed of from 6 to 12 miles an hour. It is designed for "sightseeing" parties.

The night stopping places for the endurance run to Pittsburg, as given in THE HORSELESS AGE of August 12, have been finally decided upon. The stops will be at Pinchell, Binghamton, Elmira, Buffalo, Erie and Cleveland.

G. G. Reed, of the Reed-Underhill Company, and A. M. A. Keith, of Boston, will sail from New York on September 15 for

a seven weeks' tour in a Knox automobile through Germany, Switzerland, France and England.

In connection with the recent mention of spiral piston rings in our columns, a reader informs us that a patent for such rings was granted in Great Britain to William Jessop, of Butterley, Derbyshire, in 1823.

Motor cycle contests are on the program of the tournament at Manhattan Beach, N. Y., on September 5 and 7, including a four hour amateur race for motors not exceeding 5 horse power and equipped for pedal propulsion.

William H. Chambers and C. H. Leman, of Minneapolis, Minn., are giving a 20 horse power touring car a thorough road test to ascertain its practicability for the use of traveling representatives of the Peavey Elevator Company.

We learn that George Ketcham, of Toledo, Ohio, owner of the famous trotting horse Crescens, which for some time held the world's trotting record, has ordered a White touring car to pace the horse in exhibition miles against time.

It is reported that as soon as new buildings can be erected on the new property recently bought by the Olds Motor Works, of Detroit, Mich., they will remove their factory from River street. Plans for the new factory are now under consideration.

The Baker Electric Vehicle Company, maker of the "Torpedo," which made the world's straightaway electric kilometre record at Staten Island last year, has built a new racer, which has been baptized "Torpedo Kid." It weighs less than 800 pounds.

An unsuccessful attempt was made by a highwayman to hold up at the point of two revolvers H. D. Savage, of Cleveland, and T. J. Blaney, manager of an automobile station in Worcester, Mass., while en route from Worcester to Worcester on the night of August 18.

T. F. Manville, president of the Johns-Manville Company, returned on August 20 from a two months' trip abroad, in which he visited London, Paris, Berlin and other places on the Continent. Mr. Manville attended some tests of pipe coverings by the British Government.

At a meeting in Schenectady, N. Y., on August 24, to discuss the organization of an automobile club, C. H. Benedict, Esq., Esq. Berg, E. S. Ferguson, B. A. Burtis and W. T. Clark were constituted a committee to interest in the subject all the owners of automobiles in the city, who now number about sixty.

Application blanks for space at the next Madison Square Garden Show will be issued between September 7 and 10, and the first allotment of space will be made two weeks later. The blanks for the Chicago Show will not be issued until September 25, and allotments of space will be made at the end of October.

Thomas B. Jeffery & Co., of Kenosha, Wis., have leased the premises at 145 Co-

lumbus avenue, Boston, Mass., as a New England office, which will be in charge of Ernest A. Gilmore. The branch has a frontage of about 60 feet on Columbus avenue, and a basement, which will be equipped for making ordinary repairs.

E. B. Martin with his family left Chicago on Monday, August 17, to make an extended tour in his 16 horse power Locomobile touring car. He is to go first to New York and then tour through Canada, after which he will probably tour some in New England, returning to New York city.

The Fawkes Rubber Company, of Denver, Col., manufacturers of automobile, bicycle and carriage tires, have opened an office and salesroom at 1670 Broadway, near Fifty-fifth street, New York. B. S. Courtney, formerly agent for the Long Distance tires, is the general Eastern agent.

The exports of automobiles and parts from the United States to foreign countries in July, 1903, amounted to \$150,739, and the total amount for the seven months ending July was \$878,179. In July, 1902, the exports were \$133,073, and the total amount for seven months ending July, 1902, was \$714,230.

Among the special events to be held at the Rhode Island Automobile Club race meet at Narragansett Park, Providence, on September 19 will be speed trials and match races between "Barney" Oldfield, George C. Cannon and L. P. Moores. Oldfield will try to lower his mile record of 55.45 seconds. Mr. Cannon expects to use his remodeled steamer.

"Barney" Oldfield is quoted as having declared that on account of the criticism passed upon his race at Louisville, Ky., on August 15, he will never again race in that city, and that by substituting another machine for his Winton (which was incapacitated by a broken axle), in order not to cause any disappointment, he broke his contract with the Winton Motor Car Company.

Practically all the automobile dealers in Denver, Col., have agreed to participate in the events scheduled for September 9 and 10. An endurance run on September 9, a hill climbing contest and a parade are among the features proposed. The automobile club will have charge of the classification, and it is hoped by the promoters to make "Automobile Day" an annual event in the city hereafter.

The revised list of the events of the Rhode Island Automobile Club at Narragansett Park, Providence, on September 19 is as follows: First race, gasoline, 1,200 pounds and under. Five miles. First prize, \$100; second prize, \$50. Second race, all motive power, 1,800 pounds and under. Five miles. First prize, \$100; second prize, \$50. Third race, all motive power, all weights. Ten miles. First prize, \$200; second prize, \$100. Fourth race, steam carriages, all weights. Three miles. First prize, \$100; second prize, \$50. Fifth

race, open class electrics. Two miles. First prize, \$100; second prize, \$50. Sixth race, motor bicycles, single machines, open class. Five miles. First prize, \$50; second prize, \$25; third prize, \$10.

Guide posts have been placed recently throughout the town of Palmer, Mass., "for the convenience of automobilists, etc."

The works of the Videx Automobile and Carriage Company at Marlborough, Mass., have been closed, several attachments having been served against the firm.

Vero Churchill, an artist, left Atlantic City, N. J., on Saturday last in an automobile with the avowed intention of making a trip around the world, going across the United States to San Francisco; from there by way of Honolulu to Japan. He expects to cross China and India, returning to the European side of the Atlantic by the most direct route. The trip will, according to Churchill's calculations, take about a year.

R. B. Kerr, ex-secretary of the National Golf Association, has just returned from a 1,000 mile tour in New England in a Locomobile touring car. He reported the roads as being particularly bad along the shore line between New York and Boston, recommending anyone making a run between New York and Boston to take the Hartford, Springfield and Worcester road, this being infinitely better. Mr. Kerr was away several weeks, averaging 100 to 125 miles a day.

The Board of Automobile Examiners of Washington, D. C., on August 21 held an examination attended by sixty-eight applicants for drivers' license, including several women. The board prepared over 100 permits for the signature of the commissioners. When signed they were issued by the permit clerk at the District Building. Numbers are assigned to machines in order of application for the same, while permits to operators are issued in the order in which the applicants are examined.

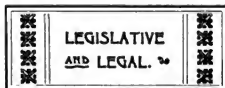
New Incorporations.

A certificate of incorporation of the New London Road Motor Company has been filed at Hartford, Conn.

The Commercial Motor Vehicle Company, of Jersey City, N. J., has been incorporated with a capital of \$300,000. The incorporators are H. O. Conghlan, W. N. Akers and Joseph M. Mitchell.

The Mohawk Automobile Company, of Detroit, Mich., has been organized; capital stock, \$400,000. It is stated that James E. Davis will be president. The company will manufacture machines under the inventions of Oliver E. Barthel.

The Willard Automobile Station, of Washington, D. C., has been incorporated with the following officers: President, Charles Jacobson; vice president, Louis P. Hall; secretary and treasurer, Albert L. Kull, with Henry Hammond and Eugene S. Cochrane form the board of directors. The capital is \$25,000.



The Commissioners of the District of Columbia are opposed to granting automobile licenses to persons under eighteen years of age.

A petition is being circulated at Camden, Me., requesting the selectmen to pass an ordinance prohibiting automobilists from using the streets between 4 a. m. and 10 p. m.

L. J. Hammond, receiver for the General Automobile and Manufacturing Company, of Cleveland, Ohio, has been allowed by the court to borrow \$10,000 to carry on the business.

The first meeting of the creditors of the Shelby Motor Car Company, of Shelby, Ohio, will be held at the office of Referee in Bankruptcy Charles H. Keating, at Mansfield, on September 14.

Sanction was granted August 27 by the American Automobile Association for an automobile race meet on the Empire City track, Youkers, on Saturday, October 3. Six regular events are on the card and several match races are to be arranged.

Resolutions forbidding the use by automobiles of the cliff drive in North Terrace Park, Kansas City, Mo., have been adopted by the Board of Park Commissioners and it is said there is some possibility of a resolution being adopted to exclude automobiles from all the city parks.

The State Superintendent of the Department of Public Works of New York has issued an order prohibiting the use of the State canal tow paths by automobilists. This is due to the recent fatal accident on the Erie Canal at Fort Plain, in which Mr. Spaulding, of Orange, N. J., lost his life while driving his machine on the tow path.

A petition in involuntary bankruptcy has been filed against the National Automobile and Motor Company, Milwaukee, Wis., by three of its largest creditors. The assets are roughly estimated at \$3,000, and the liabilities, secured and unsecured, at about \$9,000. The concern assembled automobiles and attempted to manufacture motors and carburetors.

A bill attacking the validity of the automobiling ordinance of the city of Chicago was filed in the Circuit Court on August 25 by the Woods Motor Vehicle Company and fifty other complainants. They ask that the ordinance be declared void and that the city be enjoined from causing their arrest or prosecution on account of alleged violations of the ordinance.

The new Massachusetts automobile law went into effect yesterday, September 1. The Highway Commission, which issues the licenses, added five new clerks to the auto department, so as to be able to give

as good attention to the applicants as possible. The number of applications received up to August 26 numbered more than 2,000 and every mail added hundreds more.

An affidavit of defense was filed at Pittsburg on August 22 in the case of Cyrus S. Dauler against the St. Louis Motor Car Company, an action resulting from an automobile accident on the Grant boulevard. It is alleged the plaintiff paid \$500 on a \$1,200 auto, and that the accident was the result of his inexperience in operating it, not from defective machinery, as was alleged. It is claimed the agent for the defendant found the auto in good working order.

Thomas A. O'Gorman, of Providence, R. I., has brought suit against the Central Automobile Exchange, of that city, to recover \$4,000 damages. He purchased from defendants a White steam touring car for \$2,000, he claims, and found it unsatisfactory. The defendants maintain that the machine was sold to complainant as a car which had already been used, at a substantial reduction, and that the trouble with it was entirely due to rough, careless handling by complainant.

Application was made in the District Court at Cleveland, Ohio, on August 25 to have the General Automobile and Manufacturing Company declared bankrupt. A receiver was appointed for this company in Common Pleas Court the previous week. It was stated that the company owes debts to the extent of at least \$60,000, which cannot be met in the ordinary manner. The creditors who made the application and the amounts of their claims are the Whiteley Steel Company, Munice, Ind., \$1,157.04; the John F. McCanna Company, of Chicago, Ill., \$222.20, and H. G. Slatmyer, of Cleveland, \$175.

Club Notes.

A. C. OF CALIFORNIA.

On August 6 the Automobile Club of California, San Francisco, had a run to San José, where the participants were the guests of the San José Automobile Club. The following morning they went to Del Monte, where the automobile races took place. They started for home on August 12. Many members of the San José Automobile Club also participated.

CHICAGO A. C.

Members of the Chicago A. C. will entertain about thirty members of the Grand Rapids A. C. in Chicago on September 4 and 5. They will be met at the boat landing Thursday, September 3, by a reception committee, and Friday will be devoted to a luncheon, a run to Fort Sheridan, and a dinner at the Moraine Hotel. Saturday the boulevards and parks will be inspected, followed by a dinner at the Chicago Beach Hotel. Sunday, September 6, there will be a run to La Grange via Riverside for inspection of the golf club links.

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...EVERY WEDNESDAY...

Devoted to
Motor
Interests

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The Club Run to Boston of the A. C. A.

Since the Manufacturers' Association
has taken in hand the organization of con-
tests and shows the Automobile Club of
America may be considered to have en-
tered upon a new period of its existence.
Its opportunities for "promoting original
investigation in the mechanical develop-
ment of motor carriages" are more lim-
ited than heretofore and the club will in
future occupy a position very similar to
that of provincial automobile clubs.

In comparison with former events (future
events organized and managed by the club
will depend for their success more upon
the interest of the individual membership
than upon the energy of the organizing
committee, and for this reason the club
run to Boston and back, which is to be
held the latter part of this month, will in
a sense constitute a test of the life of the
A. C. A. and the interest of its member-
ship in automobile events. The run will
be something of a novelty, for although a
few long distance automobile runs have
been organized by foreign clubs in the
past, as yet none approaching this scale,
entirely devoid of commercial objects,
have been organized here. The club's
proposed winter run to Lakewood and
then to Philadelphia last winter unfortu-
nately had to be abandoned, owing to the
contrariness of the weather; but weather
conditions will not be likely to disturb the
Boston run.

If the project arouses among club mem-
bers the interest it deserves the caravan
of club autos to Boston ought to be as
large as that of manufacturers' vehicles
to Pittsburg, in the endurance contest
closely following the club run. The two
events will in a sense complement each
other. For while in former endurance
contests, both here and abroad, a section
has been provided for vehicles entered by
private owners, in the coming endurance

contest vehicles will be entered only by
manufacturers and agents.

The route of the run leads through the
most attractive touring section of the coun-
try, and the event ought to prove highly
enjoyable to the participants.

Sprags and Drags in Mountain Touring.

As compared with European cars, those
of American construction are usually im-
provided with a sufficient number of brakes
and other stopping devices. Development
in this direction seems to have been the
reverse here to that abroad. For while
French cars some years ago nearly always
had from three to five brakes, the first cars
of American construction had only one.
One reason for this may be that America,
or those parts of it in which automobilism
first took hold upon the public, is in gen-
eral much less hilly than France. In con-
nection with the multiplicity of brakes on
the earlier foreign machines it may be re-
called that a young American millionaire
some years ago when reprimanded for fast
driving told the judge that his car was
equipped with five distinct brakes and that
each of them was powerful enough to stop
the machine in almost its own length.

Since then foreign manufacturers have
found it unnecessary to provide so many
brakes, while American manufacturers of
cars suitable for touring now nearly always
fit two distinct brakes, of which one acts
directly on the wheels. Such a brake equip-
ment is required by law in France and for
this reason it has been impossible so far to
introduce American runabouts into France
without fitting an additional brake.

French automobiles, in addition to the
brakes, are generally provided with sprags
which will hold the car on a hillside. Be-
sides, when French automobilists wish to
make a tour through a particularly moun-
tainous country they frequently have fitted
a drag which is suspended behind the rear
wheels and can be let down and wedged in

under the rear wheels, preventing the wheels from turning in the same manner as a block does. It must be admitted that a heavy drag suspended at the rear of the car does not add to its æsthetic appearance, but we presume that the majority of automobile tourists will agree that the appearance of the car is of less importance than absolute safety.

We believe it would be a good idea for automobilists going on a tour including runs through mountainous districts to have their cars fitted with either a sprag or a drag, even if they are provided with two good brakes. Efficient stopping devices are absolutely necessary as a guarantee of safety in mountain touring.

Fuel Competition of the A. C. F.

Among the most useful and interesting competitions organized by the Automobile Club of France so far must be reckoned the competition of motor fuels, which has just been brought to a close and of which a brief report appears elsewhere in this issue. In France, it might be stated by way of introduction, the conditions in the fuel market are somewhat different from those obtaining in this country. Although the crude oil is obtained almost exclusively from the United States, the business of refining is divided between a number of independent though large concerns, instead of being controlled by a monopoly, and French automobilists have the choice between quite a number of brands of gasoline, all designated by copyrighted trade names. Each of the refiners offers to the automobile public several grades of different density, and as recently also quite a number of alcohol mixtures for motor use have made their appearance, there were easily enough prospective competitors to promise a successful competition.

As far as the results are concerned, they only confirm what was known in technical circles before. It was known that the heavier grades of gasoline have actually more heat value or power value than the lighter grades. The falling off in power which is sometimes observed when a heavier grade of gasoline is used in an engine than it is designed or adjusted for, is due, not to the inferiority of the fuel, but to a peculiarity of the float feed carburetor which results in a reduction of the fuel charges in proportion as the fuel is heavier. The supposed important discovery that kerosene could be used in a gasoline motor without special adjustment and with a gain in

power—so important that it was made the subject of a special cable message to this country—is only another confirmation of the old saw that there is nothing new under the sun, for anyone who will take the trouble to look up the issue of *THE HORSELESS AGE* of July 22 last will find that an American manufacturer had discovered before that date that his carburetor and engine, designed originally for gasoline, would run just as well on kerosene, except for the starting.

The fuel consumption per horse power hour for the motor with which the tests were made was practically one pint, which is a good rule to remember, as it holds approximately for all good motors of considerable size running at moderate speeds. An 8 horse power motor of this description should therefore consume about a gallon of fuel per hour when running constantly on full load. For small high speed motors the fuel economy is, of course, lower, as was shown by some comparative tests with the 5.6x6.4 motor and a 3.4x3.6 motor. The consumption per horse power was lower with the larger motor in nearly every test, and in one test by about 30 per cent.

The most interesting results of the trials are undoubtedly those relating to the alcohol mixtures, which permit a direct comparison of these fuels with gasoline for motor purposes. The conclusion to be drawn from the results is that alcohol-gasoline mixtures of equal parts will give approximately the same motor power as gasoline alone, but the fuel consumption is increased about 25 per cent.

Girder Section Construction.

There is little doubt that girder section or I section construction will eventually take a place in automobile manufacture similar to that of tubular construction in bicycle manufacture. There are in the frame, motor and driving mechanism of an automobile many parts which are subjected to bending stresses only, particularly in one plane, and in all such parts a girder section is the most rational, giving the greatest strength with the least amount of material. Really the most important part to which this construction would be applicable is the frame. It is doubtful, however, whether the side beams of the frame will ever be made of girder section, except in strictly business vehicles. The girder form has something of the mechanical about it that does not harmonize with fine carriage forms, and the general

practice, therefore, even in the most up to date cars in which girder section construction is quite extensively used otherwise, is to make the main frame beams of channel form. The cross beams, however, and the parts of the false frame for supporting the motor and change gear are commonly made of girder section.

The process of eliminating dead weight must finally be applied to the minor parts, such as operating levers and their connections, bell cranks, etc. And as in these parts the stresses are mostly bending stresses in a certain plane, there seems to be an opportunity here to reduce weight without reducing strength by the use of girder sections. At present these parts are mostly of oval section and sometimes rectangular, but the girder section is perfectly applicable, although the thickness of metal would be very small.

Beginning of the Fall Race Events.

The first of the series of races which are to be held this fall under sanction of the A. A. A. took place at Cleveland on Friday and Saturday last, September 4 and 5. While the event was on the whole quite successful, it was marred by a number of accidents both during the race and in the preliminary trials on the track the day before the race.

From the list of entries in the various races it will be seen that quite a number of manufacturers have built special racers for the season. Odd and freak shapes predominate and fanciful names are quite generally applied to the monsters. It is of interest to note that the three most powerful machines entered did not run, two having met with accidents the day before the races and the third being presumably "not in form." Another point of interest is the comparatively poor showing of the French "thoroughbreds." Only one out of the fourteen events was won by a foreign machine, and that on account of a big handicap.

Calendar of Automobile Dates and Events.

- September 12—Syracuse Races.
- September 18—24—English Reliability Trials.
- September 19—Narragansett Park Races.
- September 19 or 20—Empire City Track Races, Yonkers.
- September 23—Meeting of the Association of Licensed Automobile Manufacturers.
- October 2.—Paris Cab and Delivery Wagon Trials.
- October 7—14—New York-Pittsburg Endurance Contest.
- December 10—25—Paris Automobile Exhibition.

Average Practice in "1903" American Gasoline Runabouts.

By ALBERT L. CLOUGH.

It is of some interest to notice the trend of practice in the construction of American gasoline runabouts and service cars. By tabulating full data in regard to a considerable number of makes of such vehicles it is easy to determine what is average practice.

The great recent increase in the number of manufacturers in the business is perhaps the most surprising fact that meets the person who undertakes such an inquiry, and he will be not only surprised but pleased to note the cordiality with which data hitherto almost unobtainable are now given out by the manufacturers. For instance, cylinder dimensions now form a part of the data generally included in the catalogues, which was not the case before this year. Catalogues are now filled with concise technical data instead of remarks upon the joys of automobiling and comparisons unfavorable to the horse.

It is almost impossible to make a list of vehicles which shall include only cars of exactly the same class—as would be the case where exact conclusions are to be drawn. The runabout and the car for general service are oftentimes not sharply differentiated, and the touring car merges into the latter class in such a manner as not to be distinguished by any hard and fast rules. Still it is possible, by the use of a little judgment, to include in the list vehicles which it would not be unreasonable to class together for the present purpose.

The various features of thirty such vehicles have been tabulated. The cars were not selected, but taken at random.

Perhaps the most interesting point to be observed is that the vertical motor in front has made no great progress in popularity in this class of service in America during the past year. Twenty-three out of the thirty retain the horizontal type of engine of moderate speed, while six of the remaining seven use high speed vertical motors of the De Dion type—as close copies as can be made. In four of the seven latter cases the motor is not in front but in the body. It looked at one time as if the vertical high speed motor in a bonnet was going to be "the thing," even among low powered American cars, but the facts tend to show that the "Gallic invasion" has not been as sweeping as predicted.

The horizontal engines are in each case carried in the rear of the body. In seven cases out of the twenty-three a multi-cylinder construction is adopted, and in all but one of the seven the type employed is the "double opposed." All of these multi-cylinder engines are on the larger vehicles and all rated at 8 horse power or somewhat over. One of them is in reality a double piston engine, but is classed as multi-cylinder for convenience.

It may be said that the double opposed type is quite popular for engines rated at 8 to 12 horse power, but is not used for lower horse powers. Seven out of eleven of the vehicles included which have a rating of 8 horse power or over make use of multi-cylinder motors.

One matter which is of interest is the practice in regard to the operation of inlet valves. It is rather surprising to find that out of twenty-one horizontal motors for which these data were obtainable ten have mechanical operation. All the vertical motors have automatic inlet valves. This condition denotes a higher degree of popularity for mechanical admission valves than might perhaps have been expected. Perhaps absolute certainty of operation rather than any thought of increased power has been the controlling factor in their adoption.

Jump spark ignition is practically of universal employment among these vehicles. Only four out of thirty employ the contact system. The dry battery, too, seems to be virtually the only source of current in use. Wet batteries or storage cells do not figure in the list. The employment of mechanical spark generators for vehicles of this class does not seem to be increasing in popularity very rapidly, as only six out of the thirty vehicles make use of them. The small expense and convenience of dry cells seem to more than offset the alleged economy of the dynamo, which necessarily increases the complication of the car, and in the case of small engines loads them to a perceptible degree.

Lubrication of the horizontal engines is generally accomplished by means of sight feed gravity cups, sometimes in connection with a splash system for the reciprocating parts. This is the case with three-quarters of the vehicles tabulated. The remainder use a forced feed magazine oiler or depend entirely upon the splash. The engines of the vertical type rely upon splash lubrication in every case.

Water cooling is still nearly universal, twenty-seven out of the thirty adhering to this system. Of the three which employ air cooling two are tiny runabouts, with vertical motors, but the third is a powerful service car, with a large horizontal engine. Probably a review of this subject next year will show more "air coolers."

Among the "water coolers" twenty-three employ circulating pumps for producing a forced circulation, while four adhere to the gravity or thermo-siphon system. All but one of the cars using forced circulation make use of tube radiators, a tank with air tubes being used in that one case.

The method of driving the pump is far from being standardized. Out of eighteen cars for which these data were obtainable seven employ gear driving, six make use of a chain connection, three are direct driven from the engine shaft and one each depends upon friction in the flywheel and a leather belt. Driving by means of gears is

thus the most popular method, probably on account of its being most positive, and making it easy to secure the proper speed.

For runabout and general utility service the planetary transmission, with two forward speeds, seems to "have the call." Twenty-two cars out of the thirty employ the planetary system, three the sliding pinion method, three the individual clutch type, one a friction drive and one a method involving chains. Two forward speeds only are provided in twenty-three of the vehicles, three forward speeds in six and an infinite number of speeds in the case of the friction arrangement.

Some people expected to find the chain drive to the rear axle generally supplanted by the bevel gear flexible shaft method this year, but this has not happened among this class of vehicles at least. Only one car in the list makes use of bevel gears; one employs spur gears, with the motor in the extreme rear of the vehicle, and the other twenty-eight use a single chain to the live rear axle.

The general use of the planetary transmission makes easy and natural the attainment of gearlessness when running on the high speed. This advantage goes far to counteract the disadvantages of some of the types of planetary gear.

One thing which strikes one forcibly in this year's list is the final "passing" of the suspension or wire wheel. Twenty-five of the vehicles tabulated employ wood wheels, three metal wheels of tubular construction and only two the wire variety. Twenty-eight inches is still the popular diameter for wheels of vehicles of this class, over half of all the cars employing this size. Thirty and thirty-two inch come next in favor.

The growth in popularity of the detachable tire is another noteworthy fact. Over two-thirds of the vehicles classified are equipped with this type in preference to the single tube variety. It is pretty evident that the public is demanding a tire which may be repaired on the road with certainty and some measure of convenience. Larger tires are used, as a rule, this year than previously upon vehicles of the runabout class. Eighteen of the cars in the list employ 3 inch tires; nine, 2½ inch, and two odd sizes.

The wheel base shows a marked increase over former practice, and much is made of this point in catalogues.

The average wheel base of the vehicles in the list is almost 74 inches. There is a strong tendency shown toward the adoption of 36 inches as a standard gauge. Nearly one-half the vehicles have exactly this gauge, and the majority of the remainder do not fall more than 4 inches short of this standard. Some of the smaller runabouts intended only for the lightest service are, of course, considerably narrower.

As a method of steering the wheel has grown in popularity even in this class of service. Thirteen of the cars steer by this

means, eleven by tiller and six by side lever.

The angle iron frame has nearly driven out tubular construction in automobile building, as is shown by the presence of only three tubular frames in the list. Reach rods are used in a few more cases, but their employment is very rare.

As to the spring suspension, the most common method calls for four double elliptics. The employment of four semi-elliptics is next in frequency of occurrence, the side spring stands next, and some composite method is used in the remainder.

As to brakes there is almost always one on the differential, which is now generally of the spur type rather than of bevel construction. In one case occurs the rather novel expedient of a brake strap on each half of the differential. In about a quarter of the cars two brakes are provided, but they are generally on the differential and the transmission, and thus not entirely independent. In three cases hub brakes alone are depended upon, but in the great majority of cases entire reliance is placed upon the differential brake, generally of the double acting strap type. In the braking system is found, perhaps, the weakest point of the American runabout as at present constructed.

Ball bearings both for front wheels and rear axle appear to be somewhat the most common practice. A combination of balls in front and rollers in the rear is next, and the use of rollers all around is almost as frequently met with. Only one vehicle employs plain bearings for the rear axle.

Some little tendency toward the standardization of gear control may be noticed arising from the general employment of the planetary system. Twenty-four of the thirty vehicles employ a single lever for securing the forward speeds, with the reverse by the same handle or a pedal. The remainder make use of a gear shifting lever and a clutch lever or pedal, or control several speeds by pedal. The throttle control is by pedal instead of by hand in about three cases out of five.

In about half the vehicles spark position is determined by a hand lever. In three instances this operation is performed by a pedal, in three others by an automatic governor, in two the spark advance is interlocked with the throttle, and in two the spark position is invariable.

The popularity of the float feed spraying carburetor is shown by the fact that no other form is mentioned as applied to any of the vehicles tabulated.

Something in regard to the cylinder allowance per rated horse power and the cylinder allowance per 100 pounds of weight in these vehicles may be found in a former article in *THE HORSELESS AGE* of August 19 last. From the data at hand a rough specification may be drawn up to fit the average vehicle of the class under discussion, as produced by American manufacturers in the year 1903.

The vehicle might weigh 1,200 or 1,400 pounds. It would be equipped with a horizontal slow speed single cylinder engine carried in the rear of the body and having a piston displacement of about 11.7 cubic inches per 100 pounds of vehicle weight. Its inlet valves might very likely be mechanically operated. Its gas would be derived from a float feed carburetor. Its ignition would be by jump spark from dry cells and it would be water cooled by means of a geared pump and tubular radiators. Its lubrication would be from a sight feed cup and perhaps by crank case splash.

Such a car would possess two forward speeds from a planetary transmission, securing gearless operation on the high, and these speeds would be controlled by a single lever, and the power would be transmitted to the drivers by a chain through a spur differential, which would carry a band brake. A pedal would control the throttle, a hand lever the ignition time, and steering would be effected by a wheel or perhaps by a tiller. Such a vehicle would probably have 28 inch wood wheels equipped with 3 inch clincher tires, and would consist of an angle iron frame resting upon four elliptic springs, with no underframe. Its wheel base would not be far from 74 inches, and it would be standard gauge or a trifle less. The bearings of the running gear would most likely be ball bearings. For such a vehicle a speed of about 25 miles per hour would probably be claimed. Such a vehicle is thoroughly American in type, and if well made should meet all reasonable requirements most satisfactorily.

The Universal Joint.

By E. J. STODDARD AND CHARLES W. BULLOWS.

It is said that this mechanical element has been used on such large work as the propeller shafts of war vessels, to enable the propeller to be turned to assist the turning of the vessel. It certainly has appeared to automobile constructors as a desirable element. In the latter connection it is probably most useful for allowing relative movement of the spring suspended and non-spring suspended parts of the vehicle respectively—in other words, proper action of the springs. This use would never require a very great angle between the shafts. A further discussion of the subject would be useful, we believe.

Professor Barr's "Kinematics of Machinery" has about as simple and inclusive a mathematical treatment of the subject as we have seen in the books, and Reuleaux's "Constructor" and Volume III of Weisbach's "Mechanics" show a variety of forms and treat of its practical design. There is a special sub-class of universal joint patents in the United States Patent Office. The ring form seems to be preferred by Reuleaux for heavy work, as it can be made in whole or in part of steel or wrought iron.

Weisbach expresses the relation between

the angular positions of the shafts in a form easy to remember, as follows:

"The ratio of the tangents of their (the shafts) angles of rotation * * * is constant and equal to the cosine of the angle between the axes."

The same authority observes that the greatest variation between the relative angular positions of the shaft occurs between successive points at which their velocities are equal and amounts to 4° 6' when the shafts are at an angle of 30°. It is said that a greater angle than 30° is not advisable, although Professor Reuleaux gives data for shafts at 40°, with which angle the greatest angular variation would be about 7° 35'. The general expression for this variation in the relative angular positions of the shafts is

$$\text{Angular variation max.} = \tan^{-1} \sqrt{\frac{1}{\cos \phi}}$$

$$(-\tan^{-1} \sqrt{\cos \phi}) \dots (1)$$

ϕ being the angle between the shafts. This gives the following values for different values of ϕ .

ϕ	Max. Variation.
10°	0° 26'
20°	1° 48'
30°	4° 6'
40°	7° 35'

Other values of the maximum variation for various angles between the shafts can be found directly from Fig. 5. A fair approximation to the values of the greatest angular variation may be obtained by simply multiplying the square of the angle ϕ , taken in degrees, by the constant .26; the result will be approximately the maximum angular variation in minutes. That is, algebraically,

$$\text{Variation max.} = .26 \phi^2 \dots (2)$$

Let us represent by a and b the angles swept through by the shafts of variable and constant velocities respectively, reckoning each angle from the time the pin of the shaft of variable velocity is at right angles to the plane of the two shafts. Then, as demonstrated in *THE HORSELESS AGE*, Vol. XI, No. 19, pages 570-572, we have the relation

$$\tan b = \cos \phi \tan a \dots (3)$$

where ϕ is the angle between the shafts.

Differentiating equation (3) with respect to the two variable angles, we have $\sec^2 b \, db = \cos \phi \, \sec^2 a \, da$, and dividing by the differential of the time, we have the equation:

$$\sec^2 b \frac{db}{dt} = \cos \phi \sec^2 a \frac{da}{dt} \dots (4)$$

expressing the relation between the angular velocities of the shafts. Solving equation (4) for the velocity of the shaft of variable velocity, we have

$$\frac{db}{dt} = \frac{1}{\cos \phi} \sec^2 b \frac{da}{dt} \omega \dots (5)$$

Since the velocity $\frac{da}{dt}$ is constant, we may represent it in equation (5) by ω .

But since $\sec^2 b = 1 + \tan^2 b$
and $\tan^2 b = \cos^2 \phi \tan^2 a$
 $\therefore \sec^2 b = 1 + \cos^2 \phi \tan^2 a$

Substituting in equation (5) we have

$$\frac{d^2 a}{dt^2} = \frac{\omega}{\cos \phi} \frac{1 + \cos^2 \phi \tan^2 a}{\sec^2 a} \dots \dots (6)$$

$$= \frac{\omega}{\cos \phi} (\cos^2 a + \cos^2 \phi \sin^2 a) \dots \dots (6a)$$

$$= \frac{\omega}{\cos \phi} (1 - \sin^2 \phi \sin^2 a) \dots \dots (7)$$

Differentiating equation (6a) with respect to the time, we have

$$\frac{d^2 a}{dt^2} = \frac{\omega}{\cos \phi} (-2 \cos a \sin a + 2 \cos^2 \phi \sin a)$$

$$\cos a \frac{da}{dt} = -\frac{\omega}{\cos \phi} (1 - \cos^2 \phi \sin a \cos a \frac{da}{dt})$$

$$= -\frac{\omega \sin^2 \phi}{\cos \phi} \sin a \frac{da}{dt} \dots \dots (7a)$$

Substituting the expression for $\frac{da}{dt}$ taken from (7) in (7a), we have

$$\frac{d^2 a}{dt^2} = -\frac{\omega^2 \sin^2 \phi}{\cos^2 \phi} \sin a (1 - \sin^2 \phi \sin^2 a) \dots \dots (8)$$

for the expression for the acceleration of the shaft of variable velocity at any point.

Differentiating equation (7a), we have

$$\frac{d^3 a}{dt^3} = -\frac{\omega \sin^2 \phi}{\cos \phi} (2 \cos a \frac{da}{dt} + \sin a \frac{d^2 a}{dt^2})$$

Replacing the first and second derivatives of a by their values from equations (7) and (8), and expressing all functions of a in terms of $\sin a$, we have

$$\frac{d^3 a}{dt^3} = -\frac{\omega \sin^2 \phi}{\cos^2 \phi} \omega^2 (1 - 2 \sin^2 a + \sin^2 \phi \sin^4 a) \frac{da}{dt} \dots \dots (9)$$

The second number of equation (9) will become zero when the quantity in parentheses is zero, i. e., when

$$1 - 2 \sin^2 a + \sin^2 \phi \sin^4 a = 0,$$

that is when

$$\sin^2 a = \frac{1}{1 + \cos \phi} \dots \dots (9a),$$

or dividing through by $\cos^2 a$ and clearing of fractions,

$$\sin^2 a \cos^2 a + \sin^2 \phi \cos^2 a \cos \phi = \cos^2 a$$

Transposing

$$\sin^2 a \cos^2 a \cos \phi = \cos^2 a - \sin^2 \phi \cos^2 a$$

Dividing by $\cos^2 a \cos \phi$, we have

$$\frac{\sin^2 a}{\cos^4 a} = \frac{1}{\cos \phi}$$

$$\tan a = \pm \sqrt{\frac{1}{\cos \phi}} = \cot b \dots \dots (10)$$

Equation (10) expresses the condition under which the acceleration shall be a maximum or minimum, the upper sign indicating a minimum and the lower sign a maximum.

Therefore to obtain a general expression for the maximum acceleration, we substitute the values of the functions of a derived from equations (9a) and (10) in equation (8) and after reducing to its simplest form we find

$$\text{Acceleration max.} = 4 \omega^2 \frac{\sin^2 \phi}{\sqrt{\cos \phi}} \dots \dots (11)$$

Since the condition for a maximum gives $\tan a$ equal to a negative quantity, the first maximum must occur between 90 degrees and 180 degrees.

$$\text{From (9a) we see } \sin a = \pm \sqrt{\frac{1}{1 + \cos \phi}}$$

$$\text{Hence, } \cos a = \pm \sqrt{\frac{\cos \phi}{1 + \cos \phi}}$$

$$\text{and } \sin a = \pm 2 \sqrt{\frac{\cos \phi}{1 + \cos \phi}}$$

which substituted in (8) and reduced gives (11).

APPLICATION.

If two joints are used the variation of one may be made to compensate for the other. However, if one joint can be omitted it is better, other things being equal.

"Unwin's Machine Design," Part I, page 243, reads: "Let P be the twisting moment transmitted by the shaft, and let R be measured to the middle of one of the journals of the forks. Then the maximum pressure on the journal is

$$\frac{1}{2} \left[\frac{P}{\cos i} \right]$$

where i is the angle between the axes of the shafts. For this pressure its diameter is calculated."

If the driver is being actuated by a constant force and the inertia of the rotating parts is neglected, the maximum force transmitted is evidently proportional to the reciprocal of the maximum ratio of velocities, hence the quotient $\cos$ of angle of shafts. The parts would have to be adapted to sustain this force in any case, but additional precautions may be necessary.

Should one desire to use a single joint in the transmission mechanism of an automobile, the inertia of the parts is by no means to be neglected. In such a case we may design the shaft for two limiting conditions and be quite sure that if it is sufficient for either it will be a fortiori answer for the actual conditions.

On the one hand, we may consider the shaft perfectly rigid, and design it so that it shall have sufficient strength to resist the force of inertia with the maximum acceleration; on the other hand, we may design the shaft to have sufficient flexibility to allow for the maximum angular variation or relative movement of the shaft.

Evidently we should never have either of these conditions by itself, because the shaft would always twist and the parts give more or less, and both the driver and driven shafts would be accelerated more or less, the one positively and the other negatively, so that the designing of the parts for one of these extreme conditions would probably be equivalent to the introduction of a factor of safety of at least 2.

We saw above that the maximum angular acceleration is

$$\frac{\sin^2 \phi}{4 \omega^2 \sqrt{\cos \phi}}$$

The corresponding torque is

$$\frac{\sin^2 \phi}{4 \omega^2 \sqrt{\cos \phi}} \frac{1}{L} \dots \dots (12)$$

where L would be taken as the moment of inertia of the part having the smallest inertia. If we design the shaft to twist within its safe working limit to allow for the maximum variation, we may reason as follows:

If we take the angular twist of a solid round shaft to be

$$T = \frac{M L}{16 \pi d^4} \dots \dots (13)$$

T being the twist in degrees, M the moment or torque in pound foot units, L the length of the shaft in feet and d the diameter of the same in inches, and the safe moment

$$M = 1000 d^3 \dots \dots (14)$$

we may by combining the two equations write

$$T = \frac{L}{1.6 d} \dots \dots (15)$$

If we put half our simple approximate expression for the maximum angular displacement (equation 2) equal to the last term of 15, we shall have

$$\frac{.13 \omega^2 L}{60} = 1.6 d$$

which reduces to

$$\phi = 17 \sqrt{\frac{L}{d}} \dots \dots (16)$$

If we substitute in this equation any two values the other may be found.

Let us assume a 1.25 inch shaft driving an automobile, the driver being provided with a flywheel weighing 115 pounds, with a medium diameter of 18 inches, and the driven shaft conveying the motion directly to the carriage. The moment of inertia, I , of the flywheel is

$$\frac{115 \times (\frac{1}{2})^2}{32} = 2.02$$

If the flywheel is turning at 600 revolutions per minute, its angular velocity, ω , is 62.8 radians per second.

If we assume the angle between the shafts to be 10° , we should have by substituting in (12)

$$(4) (62.8)^2 \frac{2.02}{\sqrt{.9848}} = 243.9 \text{ lb.-ft. units}$$

for the maximum torque developed by the inertia of the flywheel.

Substituting in (16), we have

$$10 = 17 \sqrt{\frac{L}{1.25}} \therefore L = .4325 \text{ ft.} = 5.2 \text{ inches}$$

as the minimum length of the shaft to permit of the maximum angular variation.

If ϕ were 30 degrees we should have 2,204 pound foot units as the maximum torque due to the moment of inertia, and 3.9 feet as the minimum length of shaft to permit of the angular displacement.

The above, of course, only attempts to

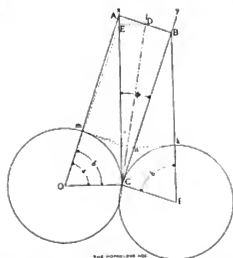


FIG. 1.

fix extreme limits within which the designer may exercise his judgment, and the limits may be considerably narrowed.

GRAPHICAL CONSTRUCTIONS.

As it is always somewhat difficult to interpret the results of an algebraic analysis, a few of the more important properties of the motions of the universal joint will be illustrated geometrically.

Fig. 1 shows the relation between the angles and $a-b$ at any chosen time. Construction: With unit radius draw the circle O.

Draw O C any radius.

" Cx tangent to circle O at C.

" xCy equal to ϕ .

" the circle P with unit radius tangent to Cy at C.

" C O A any desired value of a .

" A B perpendicular to Cy.

" B P; then B P C = angle b .

" C D bisecting angle ϕ .

" D E perpendicular to A C and connect E O.

The C O E = b .

C O A = a .

E O A = $a-b$.

Proof: C A = $\tan a$, C B = $\tan b$, and C B = $\cos \phi$, so that equation (3) is satisfied.

When the angle a is so large that its tangent cannot be drawn conveniently, the construction may be modified by drawing $m n$

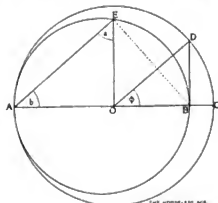


FIG. 2.

tangent to O and n K tangent to P, as indicated in the figure. K P C = b as before.

Fig. 2 gives a means of determining the relation between a , b and ϕ when $a-b$ is a maximum.

Construction: On O C (equal to unity) as radius draw a circle.

Draw C O D = ϕ .

" D B perpendicular to O C.

" a circle on A B as diameter.

" O E perpendicular to A B.

Then a , b and ϕ equal the angles indicated in the figure.

Proof: The triangle A B E has a right angle at E, therefore O E is a mean proportional between O B and A O. In this case O E = $\sqrt{O B}$ and since O B = $\cos \phi$, O E = $\sqrt{\cos \phi} = \tan b$ according to equation (10).

Fig. 3 shows the relation between the two velocities at various positions of the constant velocity shaft. A is a maximum, B is a minimum. At C and D the two velocities are equal, but their rate of change is a maximum. A consideration of this curve will show that the shaft of variable velocity starts with a greater velocity than the other, and so will tend to rotate through a greater angle. The difference between the angles of rotation will increase until the velocity of the shaft of variable velocity falls as low as that of the other. This will occur at the point C, where $\tan a = \sqrt{\sec \phi} = \cos b$ (17). To find the value of this angular difference we proceed as follows:

$$(a) \text{ Since } \sin a = \frac{\tan a}{\sqrt{1 + \tan^2 a}} = \frac{\sec \phi}{\sqrt{1 + \sec \phi}}$$

$$= \cos b,$$

$$(b) \text{ and } \cos a = \frac{1}{\sqrt{1 + \tan^2 a}} = \frac{1}{\sqrt{1 + \sec \phi}}$$

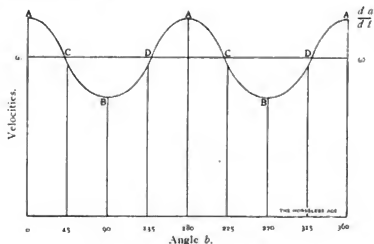
$$= \sin b,$$

(c) and $\sin(a-b) = \sin a \cos b - \cos a \sin b$, we may substitute (a) and (b) in (c) and we have

$$\sin(a-b) = \frac{\sec \phi}{1 + \sec \phi} - \frac{1}{1 + \sec \phi} \cdot \frac{\sec \phi - 1}{\sec \phi + 1}$$

$$= \tan^2 \frac{\phi}{2} \dots \dots \dots (18)$$

Fig. 4 gives a very simple method of determining the maximum value of $a-b$.

FIG. 3 — $\phi = \tan^{-1} \frac{1}{2} = 36^\circ 52'$

Construction: On O A equal to unity as diameter draw a circle.

Draw A O x = $\frac{\phi}{2}$.

" A B tangent at A.

" B C perpendicular to O B at B.

Draw a circle on A C as radius intersecting large circle at D. Then A O D = $a-b$.

Proof: O B C is a right angled triangle, therefore A B is a mean proportional between O A and A C. In this case $\frac{A B}{A C} = \frac{A C}{A D}$, or what is the same thing,

$\tan^2 \frac{\phi}{2} = \sin A O D$. Therefore equation (18) is satisfied.

Fig. 5 sums up the condition of affairs at the time of maximum difference of rotation angles of the two shafts for various values of ϕ . The ordinates of the "a" and "b" curves show the angles through which each has rotated at the time of maximum difference. The $a-b$ curve shows the value of this difference, which might have been obtained by subtraction from the ordinates.

The automobile provided by the Essex County Council (England) for their board surveyor is said to have run 12,500 miles at an average cost of 5 cents a mile, which includes a mechanic's salary, fuel lubricant, repairs and maintenance. Added to this the surveying eye covers four times as much road with a motor as is possible with a horsed vehicle.

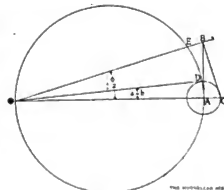


FIG. 4.

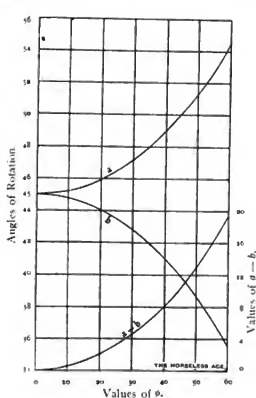


FIG. 5.

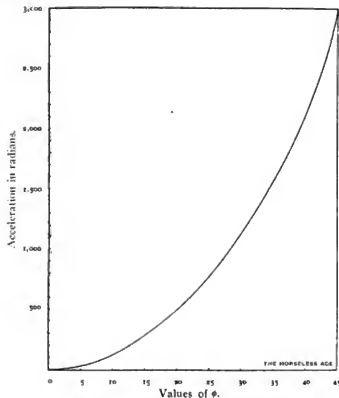


FIG. 6.—CURVE OF MAXIMUM ACCELERATIONS.

Comments on the New English Motor Law.

By J. S. V. BICKFORD.

At the present time a few remarks on the position of the automobile industry in this country and the present aspect of the legal question may not be without interest.

As most of your readers will know, a new law has recently been passed by the British Parliament to regulate motor car traffic in this country. The provisions when the bill was introduced into the House of Lords by Lord Balfour of Burleigh were in brief as follows:

The speed limit to be abolished except in certain dangerous districts and in towns where a limit of 10 miles per hour might be enforced with the consent of the Local Government Board. This latter body, it may be remarked, is not popularly elected, but Government appointed, the president being a member of the Government for the time being. The provision of this appeal in case of special restrictions fairly satisfied automobile drivers, as the L. G. B. is a fairly progressive body and in touch with up to date thought in London.

The penalties for reckless driving were enormously increased, provision being made for imprisonment without the option of a fine, at the discretion of the magistrate. All cars were to be numbered and registered.

During the passage of the bill through the Upper Chamber a clause was inserted requiring the registration of all drivers and empowering magistrates to suspend

the license of drivers as an additional penalty. It is an interesting commentary on English thought that though very little remark was occasioned by the proposal to suspend licenses of paid drivers (a similar provision being made as to the licenses of seamen in the shipping laws), much more opposition was shown to the disfranchising of amateurs than to all the other penal provisions of the bill put together, the argument or reason advanced for this opposition being that such a provision was "un-English." It may be remarked in passing that this sentiment will be sure to make it very difficult to compel obedience to this section.

In the Lower House a speed limit was introduced of 20 miles per hour, the penalties for exceeding this being a heavy fine only (maximum \$250) and suspension of license for the third offense. It was believed by many that this amendment would wreck the bill. It seems to me personally that this addition of a cast-iron speed limit is not only absolutely useless but dangerous from the point of view of other users of the high road, for a moment's thought will show that if a 12 mile limit was not observed it is not at all likely that a 20 mile limit will be. Further, such a limit will not facilitate one iota the conviction of any driver summoned for fast driving. It is almost a point of honor with a British magistrate not to dismiss a case brought by the police so long as there is any evidence worth talking about, and on the whole this tendency results in the dispensation of substantial justice in nine cases out of ten. Such being the case, if a man is summoned he will be

convicted just as much whether there is or is not a limit. The only thing that would be facilitated will be the trapping of cars on open stretches of road, and on all hands it is agreed that so far from checking furious driving, this practice, in Surrey and elsewhere, results in aggravating speeding by irritating the drivers and owners of cars who are fined for doing what they know can hurt no one.

The speed limit is absolutely dangerous for another reason. It, so to speak, gives Parliamentary sanction to this speed. Though it will of course be no plea at law that the speed was below this limit where a car is being driven dangerously, still that is sure to be advanced as some sort of excuse. Now, everyone knows that there must be a vast number of places that cannot be indicated by notices which will be unsafe at this speed.

I am inclined to think that on every count it would have been better to throw the whole responsibility for the speed on the car driver himself. If the police like to put in the speed of the car and a map of the district as evidence they will get their conviction all right, limit or no limit. In fine, a speed limit is much more likely to increase speeds than to diminish them.

There is another objection to the speed limit which was mentioned to the writer by a county magistrate. It is always pernicious to enact a law the breach of which is attended with no social stigma. A man may be convicted a hundred times a day of a breach of the speed rule, but so long as he does not drive recklessly no one of his friends will think one bit the worse of him for it. Such a state of affairs can-

not but weaken the action of the whole law and is bad in the extreme. It also seems a most questionable policy to make every member of a considerable section of the public a lawbreaker, for every car driver will admit that for all practical purposes there is not a driver in existence who does not and will not in the future exceed 20 miles per hour.

The attitude of the majority of motor drivers and papers on this side, of tooth and nail hostility to the bill, I believe to be unnecessary, though it is probably useful in mitigating the provisions of any measure which may be passed. I hold this opinion for the following reason: The administration of these laws is in the hands of the magistrates all over England. These magistrates are unpaid justices appointed by the lord lieutenant of the county, who is a nominee of the Crown, at the recommendation of the chairman of the magistrates bench for each district. Being unpaid, it follows that they are almost without exception men of comparative wealth and leisure. There are a few exceptions, such as ministers of the Established Church, doctors, lawyers, etc., but not sufficient to affect the argument. Now in five years' time there will not be one in a thousand of these men who do not own a car or whose friends do not, so that motorphobia on the part of the magistrate can hardly survive that period. I had a striking illustration of this recently. About two years ago I was coming down the line from a neighboring town with a local magistrate, and we got into conversation on motor cars, and I told him that a certain stretch of country road near his park would be very fine for trying cars. His language on this proposal in particular, and motors in general, was absolutely unprintable, and he went on to say that the cars had absolutely spoilt the Riviera. Almost the same conversation took place with another member of the bench a week or so later. The former gentleman now owns a very powerful car on which he traverses the district at speeds between 20 and 50 miles per hour, and the latter is about to buy a car and will not look at anything less than 20 horse power. There are now very few magistrates in this district who are not owners or expecting to become owners in the near future, and in no case is it 5 horse power cars they want.

To Prevent Springs from Breaking.

A frequent cause of automobile springs breaking is undoubtedly the violence of the rebound on rough roads at fairly high speeds. An ordinary leaf spring is very much stronger when the power is applied to it in such a manner that the strain divides between the different leaves than when applied in the opposite direction: that is to say, as ordinarily used. The spring will much better support a load than withstand a rebound. In slow moving vehicles, like those drawn by horses,



SPRING CLIPS ON RACERS.

the force of the direct load on the springs is always very much greater than the reverse force of the rebound, not only because the rebound is directly dependent upon speed but also because without the pneumatic tires the direct shock is greater. As the entire force of the rebound is supported by the main leaf of the spring, a violent rebound at high speed is likely to break this leaf.

The illustration herewith shows attempts to provide against this eventuality in racing cars. The cut was made from photos of some of the big machines at the last Empire City track races, and shows clips applied to hold the leaves of the springs together and distribute the strain during the rebound. These cars participated in the road races abroad, and no doubt it was found necessary in these races to provide some arrangement of this nature. It is not an uncommon occurrence for springs to break in tours on rough roads, and this method of putting clips over the springs should prove useful for touring machines.

An Overland Demonstrating Tour.

C. C. Hildebrand, of the J. Stevens Arms and Tool Company, sends us an account of a demonstrating trip he recently made in a Stevens-Duryea car in company with Otto Nestman. The route of the trip

was from Chicopee Falls to Buffalo, Philadelphia and New York and back to Chicopee Falls.

Unfortunately rains set in shortly after the start, which lasted for ten days and made the roads very bad traveling. Stops were made in numerous towns, demonstrations given and many agencies appointed.

The total time of the trip was twenty-five days and an average speed of 17 miles per hour was maintained. Among the worst stretches of road encountered was a quarter mile of yellow clay between Hudson and Albany, which it took two hours to cover. The clay was so thick and it caked so badly that the horn brake and it was necessary to get hay and grass from the side of the road and feed it to the wheels in order to secure traction. In the northern part of Pennsylvania the gasoline supply ran out 3 miles from nowhere, but after a delay the occupants succeeded in getting some. The macadam road from Harrisburg to Philadelphia was fine, and a clip of 20 miles an hour was constantly maintained. The finest stretch of road was found after leaving the fair grounds in Trenton and from there to New Brunswick.

The car was equipped with double tube tires, and twelve to fifteen punctures or blowouts occurred during the trip. Otherwise there was little trouble, except that a spring was broken by running into a pole at the side of the road. The accompanying table shows the daily mileage on the road, as well as demonstration mileage.

The German Automobile Club is said to have appropriated \$20,000 for the arrangements for next year's Gordon Bennett Cup race. Only two places on the German team will next year be accorded to the Daimler Company and applications for the third place have already been received from the Benz Company, Mannheim; De Dietrich, Niederbronn, and the Neue Automobil Gesellschaft, Berlin.

OVERLAND TRIP IN "STEVENS-DURYEY" AUTOMOBILE FROM CHICOPEE FALLS.

Date.	Miles.	Town.	Time.	Roads.	Miles demonstrated.
August 3.....	59	Pittsfield, Mass.	3 05	Fair.	30
August 4.....	43	Hudson, N. Y.	3 15	Rain.	21
August 5 and 6.....	36	Albany, N. Y.	3 15	Rain and mud.	44
August 7.....	10	Troy, N. Y.	3 30	Rain.	..
August 8.....	15	Schenectady, N. Y.	1 20	"	57
August 9.....	42	Fort Plain, N. Y.	2 50	"	8
August 10.....	37	Utica, N. Y.	3 15	"	17
August 11.....	51	Syracuse, N. Y.	3 30	Mud.	17
August 12.....	26	Amherst, N. Y.	1 15	Rain and rough.	46
August 13 and 14.....	69	Rochester, N. Y.	3 00	8 miles good.	24
August 15 and 16.....	73	Buffalo, N. Y.	3 30	Fine.	117
August 17.....	71	Rochester, N. Y.	3 15	"	..
August 20.....	67	Himrod, N. Y.	5 00	Mud.	..
August 21.....	46	Elmira, N. Y.	2 35	"	20
August 22.....	108	Milton, Pa.	7 00	Poor and mud.	..
August 23.....	75	Harrisburg, Pa.	4 30	"	..
August 24.....	54	Reading, Pa.	2 20	Fine.	..
August 24 and 26.....	60	Philadelphia, Pa.	2 50	"	101
August 25.....	70	New Brunswick, N. J.	4 00	Deep mud and fine roads.	..
August 27.....	35	New York, N. Y.	1 50	Fine.	..
August 28.....	144	Chicopee Falls.	8 30	Rain.	..

TOURING IN

AMERICA.

X.—Western Adirondack Region.

By C. H. GILLETTE.

(Concluded.)

Shortly after having left the extreme north shore of Schroon Lake, you come upon a road leading to the right from the main road. This will take you to Paradox Lake, through the village of Severance. This lake is about 5 miles north of Schroon Lake and is situated in Schroon Valley. It is 4 miles long and about a mile wide. Its eastern shore descends from Mount Knob, precipitous and rugged. The western shore is a direct antithesis; it is smooth, gradual, and accessible in most places for the landing of boats.

Beyond Paradox Lake is Moose Mountain, besides Knob Mountain, with Hammondsville in the valley between. About 8 miles farther is Crown Point Centre, near the shore of Lake Champlain. By the main road again, which finally crosses and follows the east bank of Schroon River, you reach the town of Schroon River. You are past the Blue Ridge and opposite Moose Mountain, and Old Far Mountain is just ahead. From this town westward runs a road through Blue Ridge Post Office to Ragged Mountain. The main road, however, goes straight ahead through North Hudson, past Old Far

Mountain, Saunder's Mountain, Spotted Mountain and Camel's Hump on the west, and Blueberry Hill and Harris Hill on the east, through Underwood to Euba Mills. This place was formerly called Euba Dam, but as the use of this name had a tendency to bring out in the youth of the land incipient profanity the townspeople had the name changed to Euba Mills. The road from Euba Mills leads through Elizabethtown to Westport, on Lake Champlain.

Elizabethtown is the county estate of Essex County and is a quiet little village settled almost entirely by Americans. Near it is the famous resort called the Deer's Head Inn, situated in an exceedingly pleasant location, which is a centre for riding and driving in this section of the mountains. Split Rock is at the head of Keene Valley. Near it are a picturesque waterfall and glen. North of Elizabethtown the road runs past Pitch Off Mountain, between Boquet Mountain and Bluff Mountain, close under the frowning ledge of the headland known as Poke-o'-Moonshine, and passing Augur Lake to Keeseville. The Au Sable Valley above Keeseville is picturesque in a quiet, pastoral way, growing wilder as one enters the narrow glens of East Branch. The west branch of the river joins at Au Sable Forks, coming down through Wilmington Notch, one of the most noteworthy scenic spots in the wilderness.

West of Euba Mills are Upper and Lower Au Sable Lakes. The only practicable way to reach them in a car is to take the main left hand road from Euba Mills,

which runs just south of Noble Mountain, Holcomb Mountain and Giant Mountain, through Chapel Pond Gorge to St. Hubert's Inn, near Beede's, and there take the straight road south past Armstrong Mountain and Mount Marcy—otherwise Tahawus Mountain, one of the highest of the Adirondack peaks. Beyond Beede's, on the main road, is Keene Valley Post Office, and still farther Keene Centre. This territory is Keene Valley.

Keene Valley shows the most remarkable combination of quiet valley and wild mountain scenery of any section of the Adirondacks, if not, indeed, of our continent. From the south come the sparkling waters of the Au Sable, flowing quietly beneath overhanging maples and gracefully swaying elms, rippling over glistening white sand or dashing down rocky raceways to where, among the spray and foam of the cataract, they thunder and rumble and roar as if angry with their prison walls; then out between the dark ledges, through the northern portals and away to Au Sable Forks, where the Au Sable joins its sister from the great Indian pass above. About 6 miles from the head (south end) of the valley the road from Elizabethtown comes in from the east. South of this road one follows up the stream that winds quietly back and forth through the valley, noting some of the beauties that have lent such a charm to this locality—sweet, restful, shady groves of water maples, great, massive, drooping elms, clumps of alders fringing the river bank, and great canopies of native wild grapevines clasping the huge



"SEPARATED FROM LAKE PLACID, TO THE SOUTH IS MIRROR LAKE."

rocks or festooned on the sturdy trees through which open up the mountain green, and above all the summits of naked rock. On every side the mountains rise abruptly out of the valley's floor, instead of exhibiting the usual gradual curve of mountains from a plain, showing unmistakable evidence that the lowlands are the bottom of some ancient lake whose outlet may be looked for either on the right or left of the castellated bluff that centrally fills the valley just north of where the Elizabethtown road comes in. Picturesque "bits" are found everywhere. The waterfalls are varied as the shifting forms of the kaleidoscope, many deserving particular attention. They are too numerous to mention, too wild to describe. The most perfect "picture" of the valley is that seen from Split Rock or from Prospect Hill, the latter being near the home of "Old Mountain Phelps," a characteristic Adirondack guide, and easily accessible. The most comprehensive view is probably one from Monroe Holt's outlook on the west side, near Brook Knoll. It shows almost the entire floor of the valley, and nearly all of its cottages and hotels.

From Keene Centre north the road follows East Brook, a tributary of Au Sable River, as far as Upper Jay, where it crosses the brook and river at their junction to the left, and running round to the south and west of Mount Ebenezer and Mount Bassett, goes to Wilmington.

The Au Sable Forks road runs northerly along the river past Mount Morgan, through Au Sable Chasm to Keeseville, where a good road follows Lake Champlain shore line to Plattsburg. The road, which is between Keeseville and Plattsburgh, is part of the grand route from Glens Falls to Rouse's Point and Montreal. Southward from Wilmington the Lake Placid road follows Au Sable River through the world famous Wilmington Notch to Lake Placid and Mirror Lake. Whiteface Mountain—about 5,000 feet high—towers over the road and drops abruptly into Lake Placid at Under Cliff.

"Peerless Placid" is its title. It is the gem of the Adirondacks. No lake in this whole region offers so many features as Lake Placid. Some lakes have one individual feature which takes in the whole body of water or which repeats itself wherever you look. But no other lake than Placid takes in mountain scenery, forest scenery, little sylvan nooks, such splendor of color as this lake. Truly it may be said that Lake Placid is the epitome of all the best to be seen in the whole Adirondacks.

Lake Placid village is the outgrowth of sentiment—love of the beautiful in nature. It seems that the town came into existence for no other reason than to serve as a base for those nature lovers who made Lake Placid the objective of their summer vacations. The village thrived from its inception. It has no commercial standing and

is a very quiet, droning place in the winter months. In the summer, however, it is alive and thrifty with the influx of people from all over the country who have learned to love and to satisfy that sentiment for Lake Placid.

In 1900 Lake Placid was incorporated so that it could secure various advantages in the way of public improvements. It has a library, schools, a college, and there are four churches of various denominations in the town.

Separated from Lake Placid, to the south is Mirror Lake, which has practically all of the salient features of interest that the greater lake has. In fact, it is a miniature of Lake Placid.

On the eastern shore of Lake Placid is a resort—the Ruesscaumont—which is one of the principal hotels of the Adirondacks. It is situated in a spot which appears to have been carved as a niche out of a virgin forest. There are many cottages and wall tents in the vicinity. The best view of Lake Placid can be obtained from the Eagle's Eyrie, which is at the north end of Lake Placid. The ascent to this summit cannot, of course, be made with any vehicle. By leaving the lake at Whiteface Landing and following a precipitous trail for 3 miles a point can be reached where a superb view of Lake Placid can be had. The lake lies like a picturesque body of water at the tourist's feet. The rocks and wooded slopes on its shores give much variety to the general view, and its islands, covered with foliage, rise in pleasant contrast to the deep blue of its waters.

The celebrated farm of John Brown, where the abolitionist lies buried, is about 2 miles southeast of Lake Placid. It is a point of almost sacred interest for a great many tourists, particularly those of an elder generation who remember the strenuous times of the Harper's Ferry uprising and the Civil War.

The grave of John Brown, is well preserved. The old headstone which was erected in memory of "Capt. John Brown," who died in 1776, does duty as a marker also for the "Old Man of Ossawatimie," as well as for two of his sons, one of whom was killed in the tragic fight when his father was captured. A box with glass front and back is built over the old tombstone, protecting it from the souvenir hunting vandals, while permitting a close inspection of the inscription.

From Wilmington the main road strikes almost due west past Wilmington Mountain to Forestdale and Franklin Falls, where it bends sharply to the left and continues, bearing gradually to the right, to Bloomingleale.

The road to Paul Smith's from Bloomingleale continues due west through a territory crowded with well known resorts. Mountain View Farm is to the north of the highway, which just beyond crosses the railroad to Osgood Lake and Lower St. Regis Lake, where Paul Smith's Hotel

is situated. Perhaps no name is better known in the history of the Adirondacks than that of Paul Smith, who in 1861 built a small house for the accommodation chiefly of sportsmen on the lower St. Regis Lake. The name of the hotel has never been changed, though it has increased to a capacity of upwards of 500 and is in an exceedingly pretty spot for tourists to visit. There is a road running northeasterly from this hotel to Rainbow Lake. It crosses the railroad near the lake and follows, about half a mile from it, the shore line through Rainbow. Hartwell and Round Pond to the lower end of Loon Lake.

Rainbow Lake is noted as being one of the best fishing grounds in the Adirondacks. It is convenient to as good a hunting place as can be found, and is surrounded by some of the most magnificent mountain views to be found anywhere.

With regard to the fishing, there is a little mountain stream emptying into Rainbow Lake from Loon Lake Mountain, which fishermen vow is the best fishing stream to be found anywhere in the Adirondacks.

Loon Lake is about 2½ miles long. It is a wonderfully beautiful sheet of water, with high tumbling banks and irregular and rugged shores. Unfortunately, lumbermen and forest fires have done much to take from Loon Lake its pristine beauty. Loon Lake House stands on a high ridge at the south end and looks down into the body of water, which seems to lie as if in the mouth of a volcano.

There is a road from Bloomingleale which runs southward, passes Moose Pond and goes to Saranac Lake and Saranac Lake Post Office. From this village there is a road running southeasterly to Lake Placid and Mirror Lake which, turning left, runs into the Lake Placid road to Wilmington. Another short road from Saranac Lake Village goes to Hotel Ampersand, on the north shore of Lower Saranac Lake.

Lower Saranac Lake is a very picturesque body of water about 5 miles long and one-quarter of a mile wide, and contains fifty-two islands, or, as the oldtime Adirondack residents say, "one for every week in the year." Numbers of private cottages and camps are to be found during the summer season upon its shores.

Saranac Lake is a picturesque little village of about 1,000 inhabitants, lying low in the valley. It is interesting to tourists as illustrating the way in which the modern and progressive up to date methods have supplanted the easy going "old settler" ways of the people who settled the Adirondack region. The architecture of the logger, the hunter and the fisherman is seen side by side with the modern hotel, office and store buildings in the streets of Saranac Lake.

Another road from Saranac Lake Village cuts across the railroad to West Harrietstown, there turning left to Lake

Clear. Following along this same road you finally come upon the north end of Upper Saranac Lake, on the banks of which is Saranac Inn. West of this lake is a myriad of little tributary lakes and ponds, between which there is a winding road which unfortunately is scarcely practicable for a car. The main road, however, continues along the west shore of Upper Saranac Lake southward to Rustic Lodge and Spectacle Lake, and there turns sharply to the left to Middle Saranac Lake.

Upper Saranac Lake is one of the important bodies of water in the Adirondack region. It is nearly 1,600 feet above tide-water and is 8 miles long, measuring north and south, and nearly 2 miles wide at its broadest point. A current runs through the lake, causing in one place a descent of about 35 feet in 100 rods. It may be reached from the Saranac Station over a fair road, but the lake steamer is not large enough to carry automobiles to points on the shore.

Saranac Inn, near the lake, is considered one of the finest hotels in the whole Adirondack region. The waters in this vicinity are eagerly sought by fishermen and there is an abundance of hunting to be found within easy reach of the Inn. The house was a favorite resort of President and Mrs. Cleveland during their outings in the Adirondacks.

Middle Saranac Lake is commonly called Round Lake, from its general shape. It is about 2½ miles in diameter. Its shores are bold and are noted in the fall for the beauty of the autumn dress of the trees and the foliage which cover them. Ampersand Mountain, which lies near the lake, may be ascended in from two to three hours, following a blazed trail which starts at the sand beach at the brook on the easterly side of the lake. From the top of Ampersand Mountain may be obtained one of the finest views in the whole district.

To the right of this road towers Mount Ampersand, beneath which lies Round Lake. The only way to get back to the starting point from this point is to retrace the road to Saranac Lake Village and then take either the one to Bloomingdale or the right hand road to Mirror Lake.

In this whole region of the Saranac lakes nothing strikes one more forcibly than the fact that nature blooms there in such wild profusion. Pictures cannot show nor tongue tell one infinitesimal fraction of the beauty a little observation will reveal. A step from the roadway into the underbrush and you run across a little rock such as the illustration given. Perhaps it is a little vale that you come to, the sides of which are studded with jutting rocks and a splash of mountain daisies. Perhaps it is on the bank of a lake where you make this little trip afoot. You will find the same profusion of bloom. When one has seen, day after day, the grand outlines of the valleys and mountains,

there is a sense of exquisite pleasure in turning the eyes nearer where, at the feet, lie such dainty, exquisite vegetation.

Besides these two grand routes—one from Long Lake and the other from Saranac Lake—which have been described, there is another route in the northern lesser mountains of the Adirondacks which it will pay the tourist to take.

From Rouse's Point to Malone is not a very long route, but it is a route upon which may be seen some of the most magnificent mountain scenery in the Adirondacks.

Rouse's Point is the best entrance to the Adirondacks from the northeast. It is the most important port of entry on the northern frontier in the United States and has a further recommendation in the distinction of being upon the direct and, in fact, the only route to Montreal. It is 107 miles north of Whitehall.

After having reached Rouse's Point from Glens Falls, either by way of the route along the west shores of Lakes George and Champlain, or that along the



"STUDDED WITH JUTTING ROCKS AND A SPLASH OF MOUNTAIN DAISIES."

eastern shores through Vermont, to reach Malone you turn to the left to the town of Champlain. Thence your way lies by the Champlain road through Mooer's Forks, along the Ellenburg road, through Ellenburg to Chateaugay Post Office. From Chateaugay the Chateaugay River road leads southward to the Lower and Upper Chateaugay lakes.

Upper Chateaugay Lake is approximately 4 miles in length and half as wide. It empties into the lower lake, which is to the northward, through the narrows. All along its shores are many favorite resorts and in its centre is a picturesque little island. Its vicinity is a well known hunting ground and in its waters and its tributary streams fish are abundant. Lower Chateaugay Lake is half a mile wide and about 2½ miles long. Its shores slope gradually from surrounding foothills.

North of Chateaugay Station is Chateaugay Chasm, which in many respects equals and resembles Ausable Chasm. It is truly one of the wonders of the Adirondacks. It is but a half mile in length, but that short space is crowded with hundreds of grand nooks—beautiful and awful—which,

taken in the aggregate, make one wonder at the handicraft of old Dame Nature. The chasm is walled by perpendicular cliffs, through which the Chateaugay River pours in torrents and falls amid spectacular whirlpools. It is a perilous place to investigate close at hand; stairways and galleries are the safer means for the sight-seer; but still we wish the stairways and galleries were not there, that nature had been left unadorned.

From Chateaugay the main road to Malone goes through Burke and crosses Salmon River. Malone is considered one of the important towns in the State. It is the county seat of Franklin County and is a flourishing, wideawake village. Beyond this point there is little automobile travel possible, and the tourist must be content, unless he wishes to pursue his course on foot, with the view of the mountains beyond from the tonneau of his car. Southward from Malone a road leads to Loon Lake and Rainbow Lake and joins the route to the Saranac lakes. But it is very hilly and is difficult work for a car.

These routes are essentially all that are practicable for the automobile in the Adirondacks. But there is a constant movement toward road improvement throughout the district, and in a few years many new, charming sections will undoubtedly be opened up to the tourist on wheels. The routes given provide enough variety and pleasure. I am sure, for anyone who desires to tour in these mountains. The main thing to be remembered is that one must lay out his itinerary before the trips are begun.

Changes in Endurance Contest Rules.

It has been definitely settled that the daily stops of the coming endurance run will be as follows:

New York to Pine Hill, Binghamton, Bath, Buffalo, Erie, Cleveland, Pittsburg.

We hope to be able to give the full details on Mr. Unwin's return from his present trip about a week hence.

At the meeting on Tuesday, September 1, the rules were so amended that tanks may be filled at the midway stop, provided such filling is done within the hour allowed for luncheon. The weight to be carried to secure the maximum number of points was reduced from 30 to 25 per cent., extra parts not to be weighed with the car, nor will they be accepted as a part of the ballast. In other words, it will be necessary to carry 25 per cent. plus the weight of extra parts and personal baggage.

New Incorporations.

The Trebert Gas Engine Company, of Rochester, N. Y., has been incorporated by Henry F. Trebert, J. George Wagner, Jr., and Thomas Corkhill.

The Chicago Gasoline Storage Company has been incorporated by N. H. Minter, D. H. Jackson and W. A. Walker.

LESSONS OF THE ROAD

A One Thousand Mile Tour in New Jersey.

By HARRY B. HAINES.

(Concluded.)

FENCE WIRE COMES HANDY.

This thing had happened before, and I had a spare key ring in the tool box, but upon trying to put it on I found that it was too large to go through the hole in the end of the valve stem. It looked very much as if we were "up against it," and after worrying for a time I noticed a barbed wire fence nearby. It was an inspiration for me, and without one qualm of conscience I secured my pliers and cut one of the strands, getting a piece of wire which, when bent into place, served the same purpose as the key ring. We were able to start again, and at Lakewood I managed to secure a smaller key ring. The wire was working so well, however, I did not take it off, keeping the key ring for another emergency. I used the wire until my return home, and had no further trouble from this source.

After securing gasoline at Lakewood and running about for a time in the vicinity among the many fine estates, we decided to run back to New Brunswick, avoiding again the shorter route to Asbury Park, as it was riding we were after and no desire to get back to the coast.

We reached New Brunswick late at night without incident, and put up until the following morning. In the morning, after some debate, we decided to run to Philadelphia, via Trenton, and then complete the run back to Asbury Park, via New Brunswick.

At 8 o'clock we were off, running through Dayton to Cranbury, and thence to Hightstown. Outside of this place it was necessary to stop the motor to let a fractious team pass, a woman who was driving them having become panic stricken at our approach. From Hightstown to Trenton was easy sailing, and nothing marred the trip. After lunch at Trenton and a little gasoline feed for our "horse," we decided to push

ON TO PHILADELPHIA

by the Pennsylvania route, via Tullytown, Bristol, Tacony and Frankford. The roads were not particularly good, and between Bristol and Crocyden we lost our way, going about 5 miles before we were set right again. It took three hours to cover the distance, and we decided to put up at Philadelphia until the following morning. I left word at the storage station to have the gasoline tank and the grease cups all filled and the machinery oiled, and then went out to clean up.

The following morning another flat tire

greeted us, and despite the fact that I could see no signs of a puncture, I decided to take the inner tube out and test it. This done, it was found that the valve was leaking. Taking out the plunger inside, I noted that it was slightly rusted. A gasoline and oil bath fixed it up again, and when the tube was replaced and the tire inflated it was as good as ever.

We decided to return to Trenton by the New Jersey route, via Camden, Riverside, Beverly, Cooperstown, Burlington, Columbus and Bordentown, a very pretty ride over fairly good roads. After crossing the ferry from Camden to Beverly, we were going down a slight grade when I noted an auto standing by the roadside, apparently in trouble. Upon approaching closer I found that it was a machine of the same make as my own. Two men were working over it and I stopped to see what the trouble was. I doubt if I have ever received a warmer welcome than those two belated travelers gave me, and they at once asked me if I knew anything about the machine. I assured them that I was familiar with the principles of operation and a few other points, and inquired about their difficulty. They told me that the motor had been acting very strangely and did not govern properly, running very fast with the spark lever drawn back to the point where it ordinarily went slowest, running fairly well with the spark lever advanced half way, but when the lever was thrown 'way open the motor choked up and stopped entirely.

FAULTY REASSEMBLING.

They had come over from Philadelphia, and the machine had suddenly started skipping spark. The driver had taken out the plug and cleaned it, and then taken off the carburetor, needlessly disconnecting the connections on the butterfly valve controlling the gas supply, and also the spark lever. He had put the parts back, and then found that a short circuited wire was causing the skipping of the spark; but when he started the motor it acted in this strange and apparently unaccountable manner. He started the motor in order to show me its antics, and sure enough it acted in exactly the way he had described. Strange to say, the day previous to starting on my trip the mechanics at the repair station at home had been talking about a motor acting in this manner, and one of them had told about taking out the gasoline tank half a dozen times and setting the exhaust valve cam before finally locating the trouble. It seems that the butterfly valve or damper controlling the flow of gas when set must have the lever arm pointing forward. If the lever is put on with the arm pointing back the action of the valve is reversed, and instead of giving more gas as the spark is advanced the supply of gas is shut off. I looked at the valve arm in the stalled machine, and as I expected found it to be set in the wrong position. Taking a pair of pliers I pulled out the cotter pin holding

the valve arm and turned the valve forward, replaced the cotter, and upon starting the motor it ran like a charm.

To say that the owner of the machine was delighted is putting it mildly. He gave me his card and insisted that if I ever happened along his way the best the country could afford would be none too good for me. He continued with me as far as Trenton, the run to that place being without incident.

GREASE PASSAGE CHOKED.

All the way to Trenton I had experienced difficulty in turning up the grease cup on the outside of the flywheel, which lubricates the main bearing on the crank shaft. I had managed to force a little grease in by the use of a heavy wrench, being unable to turn the cup up with my hands. I decided to take the cup off and find what the trouble was, but upon removing it I could not find any dirt in the grease. I then secured a wire to see if the feed hole was clear, and upon probing with it found that the passage of the grease was stopped by some object lodged in its path.

After half an hour's hard fishing I finally had the blockade broken and, much to my surprise, got a large sized steel ball out of the grease hole. The bright fellow at the Philadelphia station had evidently thrown this in gratis when he filled the grease cup. When the ball was taken out the cap went on easily and turned up without trouble.

Had I not located the trouble, the probabilities are that the habbit would have been melted out of the crank bearings before long.

After getting subsistence for both man and machine at Trenton we started back for Asbury Park via Hightstown, Freehold, Farmingdale and Lakewood. The roads were anything but good, and it was a hard and tedious 52 mile run. We had one stop during this trip which proved to be a puzzle. When near Freehold the motor began skipping spark and threatened to stop. We pulled up along the roadside and got out to investigate.

Taking out the spark plug and testing it the spark seemed good, and putting it back I started the engine and it ran fine, but the moment the high speed was thrown in the motor skipped spark and jerked along. After many fruitless experiments I decided to take off the various wire connections and clean the copper terminals, thinking that perhaps they did not give a good contact. When I removed the ground wire and started to clean the terminal it dropped off in my hand and the mystery was solved. The wire had broken inside the terminal and while the carriage was standing still the ends touched, but as soon as the machine started the jar over the roads separated the ends of the wires and caused the skipping of the spark.

Picking out the wire with a spare section I started the motor and we were off again, all serene. We arrived at Asbury Park late in the afternoon, tired and dirty.

SHORT CIRCULAR RUNS.

A number of short 25 and 50 mile runs up and down the coast and the trip back home completed the 1,000 miles that I had planned to cover without one absolutely serious breakdown. There were several stops due to adjustments, but no machinery breaks. The gasoline tank springing a leak also made a trip to the repair shop necessary.

During the last few days of my trip the machine began to lose power and speed without apparent cause. One of the mechanics from my home shop, who had come down to the shore for a day's rest, discovered that the inlet valve was opening too much, being set to open about double the amount intended. He readjusted the valve and this source of annoyance was removed.

I have not paid much attention to the question of roads in this article for the reason that the section of the country through which I toured is blessed with macadam roads in various stages of repair. There was the usual amount of sand and mud, but on the average the roads were fair.

The item of cost feature, counting in the cost of preparing for the trip and making it, may be of interest. My account of expenses follows, but does not include a new rear shoe for \$24, which I will have to purchase, the one now in use being badly worn and cut.

ITEM OF COST.

PREPARATION.

Bronze driving pulley for fan.....	\$2.75
New front driving sprocket on engine.....	6.00
Eighteen hours' time, at 50 cents per hour, putting sprocket on and overhauling machine.....	9.00
New inner tube.....	7.20
Tire irons, cement and rubber patches.....	2.25
New fan belt.....	2.00
Exhaust valve spring.....	.50
Total	\$39.60

TRIP.

Seventy-nine gallons of gasoline at 20 cents per gallon.....	\$15.80
Cylinder oil, lubricating oil and greases.....	3.25
Sixteen nights' storage at \$1 a night.....	16.00
New steel roller for exhaust valve arm.....	1.50
Carbide for lamps.....	1.00
New brass dust cap for front wheel to replace one lost.....	1.50
Soldering gasoline tank.....	.50
Tips on the trip.....	4.60
Total	\$44.15
Total expense for the 1,000 miles. \$73.75	

This trip has convinced me that the auto of today is a practical machine, capable of giving good and continued service when properly used; and that a trip of this

sort can be made without one serious mishap demonstrates the fact that automobile touring may be enjoyed not only by the millionaire but by the man of moderate means.

It is certainly the ideal method of traveling and, to my mind, the king of sports.

The final stage of our trip from Asbury Park to Paterson I had anticipated would be uneventful, but as usual the machine managed to develop a few kinks before I had covered that final 90 miles and was safe back home again.

Our start was most auspicious and was accompanied with a bit of good luck. Just before climbing into the machine in front of the hotel I noticed a large wire nail bent double, with the sharp point imbedded in one of the rear tires. I got down and gingerly pulled the nail out, and much to my relief discovered that it had not gone through the canvas protecting the inner tube and this was not punctured.

I put the nail in my pocket, to be added to my collection of articles and missiles picked up by tires, and getting back in the auto started off.

Everything went along nicely for the first 20 miles, and then I got out of the machine to oil up and turn down the grease cups. I set the emergency brake in order to hold the machine from moving backward, as the road sloped slightly, and much to my surprise, as I pulled the lever forward, the iron rod connecting the hand lever with the expansion ring on the brake band dropped off at the brake end. Upon examination I found that the metal connecting portion had been worn thin by the rubbing of the brake band and the brake had been holding only slightly. I wonder that it had not gone before. I took the rod off, and after oiling continued without any emergency brake.

The run from this point to New Brunswick was without incident, but while going through George street in that town the motor suddenly stopped exploding and the machine began to slow down. I threw out the clutch and pulling out the spark switch, ran to the side of the curb and got out to investigate.

Upon turning the motor over I found that there was no compression. The inlet valve seemed to be working properly and I decided that the trouble was with the exhaust valve. Getting my overalls on, I got down under the machine and disconnected the rocker arm operating the valve, and found that the small steel face that knocks against the valve stem was badly worn and did not open the valve wide enough when the motor was running, and also held it from closing. There was a consequent loss of power.

Luckily I had another face, and I unscrewed the worn one and put the other in its place. Upon putting back the rocker arm I found that there was plenty of compression, and the motor started without trouble.

The machine had been knocking a great

deal, and upon examination I found that the back end of the motor was loose, the lock washers on the nuts holding it having jarred around. This was a case of getting under the machine in the most improved joke paper style, but I did it, and after receiving two rather bad burns from the muffler pipe, managed to get the bolts tightened.

After this I had no other trouble and arrived home safely, having made the run in four hours and a half running time.

A Woman's Experience with a Gasoline Automobile.

By A. S. H.

I shall never forget my surprise and delight on being told that a gasoline run about had been ordered for me and that in a couple of hours one of last year's machines would be brought to me to experiment with until my own should arrive some days later.

I was given about fifteen minutes of instruction, and then decided to start out alone and seek a quiet road nearby where I might unmolestedly fight my own battles. Fearful of going too fast, lest I should forget which hand or foot to move in case of an emergency, I managed to stall my motor three times, and then it would take the entire strength of my left arm to turn the crank and start the machine again.

Having mastered these difficulties and repeated my experiments the following day, I went back to the agent to buy some gasoline, and asked one of the instructors to look over the machine carefully and start me safely off for a more distant ride. Proud of my success so far, and confident that the automobile was prepared to travel some miles, I returned home to get my children. I fastened each of the little ones carefully to the back of the seat by means of a safety strap about their waists, and then started out for a spin.

All went well for a couple of miles, when I noticed that we were slowing down and that the motor was making far more noise than usual. The next minute we had come to a standstill, but the crank handle was spinning around at a terrific rate. I threw the clutch back, the spark lever forward and the switch off, but to my horror the crank continued to spin and the noise to increase.

I thought of the safety of my children and the mortification of being stuck in the middle of a much used street. Then, at last, I remembered the little valve beneath my seat which I had been told not to touch. I turned it, however; the gasoline was immediately shut off and the machinery stopped. Unstrapping the children and taking them with me, I hurried to a nearby house and asked if I might use the telephone. I told my story to the instructor, who suggested that perhaps he had forgotten to fill the water tank, and I guessed he had. I swallowed my pride

and returned to the crowd already gathered about my vehicle, and announced that it was mine and I was only out of water.

During my absence a police officer, having found the abandoned automobile blocking the street, and little knowing what ailed it, had summoned assistance from one of its own kind, but alas! the occupants had no sooner arrived than they found that their water tank was dry, and they also were stuck. My carriage was pushed to the side of the road, where the crowd was good enough to leave me while I patiently waited the coming of a chauffeur, who arrived soon after and explained that the lack of water had caused the cylinder to become so hot that the explosions took place without the aid of an electric spark, thus making it only possible to stop the motor by shutting off the gasoline supply.

Three weeks later the old machine was returned to its owner and my new one arrived. It was a pleasant surprise in every way. To begin with, it took very little strength to start it and only about one turn of the crank. It made very little noise and practically none when running on high gear. The diaphragm pump on the gasoline tank had been done away with and replaced by a new carburetor having a gravity feed. Wooden wheels had taken the place of the wire ones and mud guards added much to the appearance.

Experience having taught me well the lesson of never taking anybody's word for it that my tanks had plenty of gasoline and water, and oil cup plenty of oil, and learning how to regulate "the mixture" and clean the spark plug—my difficulties soon became few and far between.

I have now used the car for five months, over city and country roads, for shopping, errands and calls, besides many a pleasure ride and an occasional tour. On one occasion I went in company with two steam automobiles on a horse party lasting three days, during which time I traveled about 150 miles over country roads, keeping pace with the others and without mishap of any kind.

A few weeks ago I wished to have my automobile in Newport, and I engaged a chauffeur to accompany me, in case of any breakdown on the road, but with the understanding that he was not to run the automobile. The roads were very good until we reached Fall River, for from there on for a number of miles they are extremely rough and sandy. The distance between Boston and Newport is 75 miles, and this we accomplished in a little less than five hours, counting out stops, which amounted to nearly two hours, owing to a faulty spark plug. We filled the water tank three times, never allowing it to get low, and we stopped in Taunton for gasoline, but I afterward found that it was unnecessary, as the five gallons we started with would have more than carried us the

whole distance. We were unable to account for the constant sooting of the spark plug, but the following day I found the carburetor leaking, and on taking the automobile to a machine shop we discovered an obstruction in the valve which prevented it from closing tightly, and consequently had caused all the trouble. All went well on my return trip to Boston, which we accomplished in four and a half hours.

It may interest those who are contemplating the purchase of a small gasoline machine to know what my experience has been in regard to the cost of repairs. Including those on the tires they have averaged thus far \$7 a month.

I have made it a practice to oil every part of the machine each day, and when any repair was necessary to take it myself to the shop and watch whatever work was done. I have gained more knowledge in this way than any other, and have found it very interesting.

Up to this date I have the pleasure of boasting that I have never been stalled on the road in my own machine.

Motor Cyclists Organize.

At a meeting of motor cyclists from nearly all the States of the Union at Manhattan Beach on Monday, September 7, a national organization was formed, to be known as the Federation of American Motor Cyclists. There were eighty-four delegates in attendance. Officers were elected as follows: President, R. G. Betts, New York Motor Cycle Club, New York city; vice president for Eastern District, Dr. George H. Perry, New Haven, Conn.; vice president for Southern District, N. N. Austin, Daytona, Fla.; vice president for Western District, B. P. Bird, Chicago, Ill.; vice president for Pacific District, Don E. Campbell, San Francisco, Cal.; secretary, E. L. Ferguson, New York city; and treasurer, Dr. G. B. Gibson, Westborough, Mass.

According to the constitution adopted, the principal object of the organization will be to secure legal recognition of the motor bicycle as a bicycle instead of as a motor vehicle, so as to exempt motor cyclists from compliance with restrictive automobile regulations. The organization will comprise territorial divisions with officers, which are ultimately to become State divisions. A general convention of the Federation is to be held annually between July 1 and September 1.

In connection with the convention there were a number of motor cycle track events on the Manhattan Beach track on Saturday, September 5, and Monday, September 7. The chief event on Saturday was a four hour amateur race for motor cycles not exceeding 5 horse power and equipped for pedal propulsion. It was won by G. N. Holden, of Springfield (1½ horse power Indian), who covered 150 miles and 75 yards. H. Owens, of Brooklyn (1½ horse power Indian), was second, having covered

142 miles 1,626 yards. N. T. Bernard, of Hartford (2½ horse power Indian), was third, with 140 miles to his credit. The special prize for the contestant riding the greatest distance without a stop was awarded to W. F. Murphy, who covered 131 miles 553 yards.

On Monday the chief event was a 5 mile handicap race, which was won by T. P. Baker, of New York city. The race furnished plenty of excitement, as no less than four machines went over the outer bank at the east end of the track and were badly damaged, while the riders escaped without injury, except N. T. Bernard, of Hartford, Conn., who broke his left collarbone. A title novice race for machines not exceeding 4 horse power was also won by T. P. Baker and a one lap obstacle race resulted in a tie between T. W. Rogers, T. P. Baker and W. H. Owen. They were then placed according to time occupied in running over the obstacle course, in the order in which they are named above.

A 1 pint gasoline consumption test was won by W. H. Owen, of Brooklyn, who covered 19 miles 1,348 yards on a 1½ Indian with 1 pint of fuel. Oscar Hedstrom, Springfield, Mass., covered 17 miles 303 yards with the same type of machine and the same amount of fuel.

A three men team motor bicycle pursuit race was won by P. Johnson, of Newark (1½ horse power Indian). Distance, 9 miles 2 laps. Time, 14:41 3-5.

It developed that the rider who entered as T. P. Baker in the novice race and other events was a professional, Ralph de Palma, and it is said that his victories will be declared void by the management and he will be enjoined by the N. C. A. from competing in races under a false name.

Allotment of Show Space.

It has been decided that allotment of space for the New York show will be made by a committee representing the Automobile Club of America, the Madison Square Garden Company and the National Association of Automobile Manufacturers Monday, November 2. All applications received by noon of that date will receive equal consideration. The application blanks will be issued on or about October 10, and application will be formally considered in the meantime.

The allotment for the Chicago show will take place on November 9. The application blanks will be issued at about the same time as those for the New York show.

These changes have been made so that the allotment may not take place at the time when the minds of the makers are occupied by the endurance test details.

At Berlin, Germany, on August 18, the first lady automobilist presented herself to be examined by an expert as to her capabilities in driving an automobile and received the police certificate.

The Races at Glenville Track, Cleveland.

The second annual race meet of the Cleveland Automobile Club took place on the Glenville mile track at Cleveland on Friday and Saturday last, September 3 and 4.

On Friday the weather was perfect, and the track was in fine condition—very hard and smooth—and considered very fast. Practically every seat of the grand stand was filled, and crowds lined the fences, while inside the fence, on both sides of the judges' stand, were arrayed long lines of automobiles which had carried spectators to the track. The attendance was estimated at 6,000. Not a single accident marred the first day's events.

The races the first day comprised seven events in all, as follows: (1) Two miles for cars under 1,000 pounds, for a silver cup valued at \$75 (six entries); (2) 5 mile handicap for club members only, each car to carry four passengers and regular road equipment, for a silver cup valued at \$85 (five entries); (3) 5 miles for cars of all powers under 1,800 pounds, for a silver cup valued at \$125 (eleven entries); (4) 10 miles open to all, for silver cup valued at \$150 (twelve entries); (5) 5 mile handicap for manufacturers' challenge cup, valued at \$350, donated by the Diamond Rubber Company (eleven entries); (6) 10 mile handicap, open, three minute limit, for \$200 silver cup (fifteen entries); (7) 1 mile for electric, for \$75 silver cup (four entries).

On the whole the first day of the races was somewhat tame, as there was nothing to match Barney Oldfield, and even his hair raising drives seemed to grow monotonous to the crowd. Perhaps the most popular wins of the day were those of the Stearns machine—first because it was the first attempt of the Stearns Company to win glory on the race track, and then because, the machine being of local construction, it stirred the local patriotism of the visitors; in addition one of these races was quite close. The two new White machines, the "Turtle" and the "Snail," proved rather disappointing during the first day, for although they developed wonderful speed at times, they ran irregularly, and periodically dropped behind considerably, indicating that the boilers did not generate steam as fast as the engines consumed it at the periods of maximum speed. The Peerless machines failed to put in an appearance, both being reported out of order. Barney Oldfield in the Winton "Pup" made a new world's track record for machines under 1,800 pounds, and D. Chisholm with the Baker electric "Torpedo Kid" reduced the 5 mile electric record from 8:40 to 6:29.3-5.

FIRST EVENT.

In the first event of the day there were four starters, as follows: Ten horse power Olds "Pirate," 800 pounds, driven by D. Wurgis; $\frac{3}{4}$ horse power Baker "Torpedo Kid," 750 pounds, driven by W. C. Baker;

12 horse power Rainey special, 950 pounds, driven by Charles Myer; 12 horse power "Ottokar," 975 pounds, driven by W. R. Stone. Wurgis with the Oldsmobile "Pirate" took the lead at the start and was first to finish the 2 miles, in 2:27.2-5. Baker made a rather poor start, but soon began to gain on two of his competitors and finished second, in 2:56.3-5. Rainey's car, driven by Myer, came in third.

SECOND EVENT.

In the second event, a 5 mile handicap for club members, there were four starters, as follows: Ten horse power Toledo, 1,660 pounds, driven by William M. Wright; 24 horse power Stearns, 3,000 pounds, driven by F. B. Stearns; 10 horse power White, 1,600 pounds, driven by W. T. White, and a 12 horse power "Ottokar," 1,600 pounds, driven by Otto Konigsloew. Wright's

"Pup," 1,750 pounds, driven by Barney Oldfield; 10 horse power Olds "Pirate," 900 pounds, driven by D. Wurgis; 24 horse power Stearns, 1,800 pounds, driven by W. C. Schroeder; 40 horse power Darraq, 1,750 pounds, driven by J. Sincholle; 60 horse power Decauville, 1,750 pounds, driven by Henri Page, and 10 horse power White "Snail," 1,600 pounds, driven by Arthur Scaife.

The White steamer made the best start and led for about three-quarters of a mile, when a pin broke in its machinery, and it was forced to retire. By that time Barney Oldfield got agoing finely, and eventually passed all competitors, winning in 5:26. Wurgis in his Oldsmobile finished second in 5:44, and Page third. The speed of the Oldsmobile "Pirate" was considered remarkable in view of its low power and weight. The separate miles in this race



GENERAL VIEW OF THE TRACK AND CARS IN THE ENCLOSURE.

handicap was one minute; Konigsloew's thirty seconds, and the other two started at scratch. All the cars carried four people and a regular road equipment. Of the two cars starting at scratch the White took the lead and soon caught the "Ottokar." But its speed soon slackened and it was overtaken by the Stearns, which kept on gaining for the rest of the race, passing the Toledo during the third mile. The race was won by Stearns in 8:28.3-5; Konigsloew's "Ottokar" came in second, in 9:15, and Windsor White finished third. One of the tires of the Toledo exploded just as it was passing the grand stand, which prevented it from finishing the race.

THIRD EVENT.

In the third race of 5 miles for cars of all powers under 1,800 pounds there were six starters: 40 horse power Winton

were completed by Oldfield in the following times: 1:17 4-5, 2:17, 3:17 1-5, 4:18, 5:26.

FOURTH EVENT.

It was now announced that Oldfield would continue to drive the 40 horse power "Pup" for the rest of the day, instead of the 80 horse power "Bullet No. 2," as announced in the program. The starters in the fourth event were Oldfield, Wurgis, Schroeder, Sincholle, Page and Scaife, the machines being the same as in the preceding race, except that Scaife drove the White "Turtle" instead of the "Snail." Oldfield won by a half mile in 10:55 4-5, and Wurgis came in second in 11:7 2-5, while Sincholle was third. When slowing down after the finish the Olds machine blew out the cylinder head, disabling it for the day. Oldfield's time by miles was as follows: 1:20 3-5, 2:23 3-5, 3:25 3-5.



START FOR THE TEN MILE HANDICAP RACE.
NO. 11, STEARNS, WINNER.

4:27 1-5. 5:29 1-5. 6:31 2-5. 7:33, 8:33,
9:34 3-5. 10:35 4-5.

FIFTH EVENT.

In the 5 mile open race for the manufacturers' cup there were four starters: Oldfield in the small Winton; F. Prong in a 4 horse power Oldsmobile, weighing 800 pounds; Schroeder in the Stearns car and J. L. Hedges in the White "Turtle." In this race the White machine showed up well, particularly at the start. Hedges' motor stopped and had to be re-started. Oldfield again won, in 5:25 3-5; Hedges came in second in 6:38 4-5, and Schroeder finished third.

SIXTH EVENT.

In this handicap race Oldfield started at scratch: Prong received 3m. handi-

cap; Schroeder, 1m. 30s.; Myer, 2m.; Page, 30s., and Hedges, 1m. Something went wrong with Oldfield's machine, and after having run about 3 miles he quit. The remainder of the race proved quite interesting, however. Schroeder won in 12:29 2-5; Page finished second and Prong third.

SEVENTH EVENT.

In the 1 mile race for electric vehicles there were three starters: W. C. Baker in a 1½ horse power Baker machine, weighing 1,200 pounds; William M. Wright in a 4 horse power Waverly, weighing 1,500 pounds, and D. Chisholm in the Baker "Torpedo Kid." The "Kid" did not start very well, and Wright was an easy W. C. Baker finished

which met with a mishap the day before, had not yet been put in shape and therefore did not compete. However, while some of the most prominent cars did not run there was more interest taken in the events by the spectators than the day before. While Oldfield was again the most successful of the contestants, the same as on Friday, the finishes were far better than those of the preceding day and the entire card proved more satisfactory from a spectacular point of view. Of the seven races on the card, three were won by Oldfield, two by Walter Baker with his electric cars, one by Schroeder in his Stearns and one by Jules Sincholle in his Darraq. The Frenchman's victory was greeted with generous applause, as he failed to make a good showing Friday, and for that reason it proved a popular one.

FIRST EVENT.

The first event of the afternoon was a novelty race of mile heats, best two in three, flying start, for a \$150 silver cup. Out of ten entries only two started—Oldfield with the Winton "Pup" and Schroeder with the Stearns racer. The first heat was pretty even, the machines remaining side by side until the three-quarter mile post was reached, when Stearns rushed in and took the pole; but Oldfield beat him by 3 feet at the end of the first mile and had things his own way in the second heat, winning by over an eighth of a mile. Time—First heat, 1:12 1-5; second heat, 1:06.

SECOND EVENT.

The ninth race of the meet was a 2 mile race for cars of 800 pounds and under, for an \$80 silver cup. Of four entries three started, viz.: Four horse power Orient buckboard, 350 pounds, driven by B. J. Ruetenick; a 4 horse power Oldsmobile, 800 pounds, driven by W. Weigle, and the "Torpedo Kid," driven by W. C. Baker. The "Torpedo Kid" was slow in starting, but soon passed the buckboard and got ahead of the Olds at a mile and a quarter. The finish was exceedingly close, however, Baker winning in 2:57 4-5, with Weigle second. The second mile was made in 1:22.

SATURDAY'S RACES.

On Saturday the weather was again fine and the grand stand was crowded nearly as much as the day before. Much to the disappointment of the crowd none of the Peerless cars started, Mr. Moers claiming that they were not in condition for fast work. The public was apparently eager to see the Peerless G. B. racer and the "Bullet No. 2" in a match, but they were doomed to disappointment. There was some ill feeling over the abstention of the Peerless Company and talk was rife of suspension from future races by the A. A., but it is not likely that anything will be done in this respect. The Olds "Pirate,"



TWO VIEWS OF THE PACKARD "GRAY WOLF."

THIRD EVENT.

The tenth race was a 5 miles, open, for a \$125 silver cup. Twelve machines had been entered, but only six started—Barney Oldfield, the two White machines, Page and Sincholle, and Schroeder in the Stearns. The Whites made a very good start, but later were passed by Oldfield and the two Frenchmen. Sincholle got in the lead in the first mile, but toward the end Oldfield gained on him slowly but steadily and finished ahead by the length of the car. Time, 5:23. There was great excitement during the fourth mile, when Oldfield and Sincholle got nearly abreast of each other. The White "Turtle" was third to finish, and Page in his Decauville fourth. The Stearns made a poor start and was lapped one mile.

FOURTH EVENT.

The eleventh race was a 10 mile handicap (3 minute limit) for cars of 1,800 pounds and under, for a \$175 silver cup. Of thirteen entries six started, as follows: Barney Oldfield (Winton), scratch; W. C. Schroeder (Stearns), 2m. handicap; Jules Sincholle (Darracq), 1m. handicap; Henri Page (Decauville), 40s.; Arthur Scaife (White "Snail"), 1m. 30s.; J. L. Hedges (White "Turtle"), 1m. 30s. The Whites and Stearns made a mile before Oldfield started, and Sincholle passed him while he was getting up speed. Schroeder maintained his lead for 3 miles, when he was overtaken by the White "Snail" and soon after by Sincholle. During the sixth mile there was a moment of intense excitement when Oldfield, after passing the grand stand, close to the outer rail, as usual, shot ahead of the "Snail" and Sincholle at the turn, missing the White car by only a few feet. An accident would have been unavoidable had not Scaife recognized the danger, and, taking advantage of his distance of about 10 feet from the inner rail, swung in a little. Either owing to misunderstanding of signals or on account of some accident to his machine, Sincholle stopped for a moment during the ninth mile, but immediately started again in pursuit of the "Snail." The "Snail's" victory seemed certain, when near the finish it all of a sudden failed and Sincholle again took the lead, and won. The actual time was 11:52 2-5. Oldfield came in third in 10:27 4-5.

FIFTH EVENT.

In the 10 mile Australian pursuit race for a \$200 silver cup there were three starters out of twelve entries. Henri Page started at the tape, W. C. Schroeder at the three-quarter mile pole and Barney Oldfield at the half mile pole. The conditions were that as soon as a competitor was passed he was to drop out, and the race was limited to 10 miles. Oldfield passed Schroeder at a mile and three-quarters and Page at the completion of the latter's sixth mile, right in front of the grand stand. Time, 6:3-5 for 6:5-16 miles.

SIXTH EVENT.

The thirteenth race was a 5 mile electric for a \$90 silver cup. All three entrants started: W. C. Baker in the 1,600 pound Baker machine; E. W. Gilbert in the 4 horse power Waverley and D. Chisholm in the Baker "Torpedo Kid." The race was pretty even between the "Torpedo Kid" and the Waverley until near the end of the fourth mile. At this time the Baker machine held the pole. Gilbert was slightly in advance and attempted to cut in ahead of his rival, but misjudged his lead and with his rear wheel took the outer front wheel off the "Torpedo Kid." The latter machine then became unmanageable and ran into the fence, which it struck at an estimated speed of 30 miles an hour. The driver had sufficient presence of mind to immediately shut off the power and duck his head below the cover of the car. Owing to its very low build the machine passed under the rail and then rolled down the embankment against a tree and into the stable ground. The inner fence was lined with people, and when the collision occurred there was a scramble for safety among those in the vicinity, but at least four were struck and one of the injured fainted. Fortunately, it is learned, none of the injuries were very serious. When Gilbert saw the result of his ill judged move he stopped, and W. C. Baker was the only one to finish, in 9:15 3-5.

SEVENTH EVENT.

The fourteenth and last race was a 10 mile open handicap (3 minute limit) for a \$200 silver cup. Out of twelve entries the following started: Barney Oldfield (Winton "Pup"), scratch; W. C. Schroeder (Stearns), 3m. handicap; Henri Page (Decauville), 1m.; Arthur Scaife (White "Snail"), 1m. 30s.; J. L. Hedges (White "Turtle"), 1m. 30s. This event was won by Schroeder in 12:21 4-5. The White "Turtle" made a fine showing, finishing second.

This event was followed by a number of exhibition races against time. The Orient, in an attempt to lower the record, made a mile in 2m. 3s.

Hedges drove the White "Turtle" to miles for records for steam machines and lowered the 5 mile record from 6:24 to

6:7 3-5 and the 10 mile record from 14:06 to 12:20 4-5. The different number of miles were accomplished in the following times: 1:10 2-5, 2:23 2-5, 3:35 1-5, 4:49 3-5, 6:17 3-5, 7:22 2-5, 8:39, 9:51, 11:5 1-5 and 12:20 4-5. Then Oldfield started to miles for records, but stopped in the ninth mile on account of tire trouble, after making 8 miles in 8:09 2-5.

Following is a list of the officials of the race meet: Referee, A. R. Pardington, chairman racing board A. A. A.; clerk of course, Clifford B. Haskins; assistant clerks, James Josephi, L. C. Dorn and H. H. Schleman; starter, Ezra Kirk; scorer, W. A. Skinkle; judges, F. T. Sholes, E. Shriver Reese, C. M. Taylor and Charles H. Tucker; timers, J. H. Collier, R. R. Owen, W. G. Pollock and W. E. Metzger; racing committee, George Collier, C. B. Shanks and W. F. Sayle; announcer, George A. Schneider.

CLUB BANQUET.

During the evening a banquet was tendered the visiting members of the trade and others at the Hotel Hollenden by the Cleveland Automobile Club. Short addresses were made by Windsor T. White, Ezra Kirk, Barney Oldfield, Cliff Haskins and George Collier. A. R. Pardington, secretary of the A. A. A., made the chief address of the evening. He said in part:

"To the end that local sentiment may be fostered and local restrictive legislation watched by means of State divisions or sub-organizations, it has been proposed and suitable legislation is now being formulated which will make the following possible, namely: The national organization to continue as now composed of clubs and individuals; to take into the national organization each club in each State of the Union; the initiation fee for each club, namely, \$10, to remain as now; the annual dues for each member in each club to remain as now, namely, \$10.

"After the election of the various clubs the national body will return to a State division of sub-association one-half of the initiation fee and one-half of the annual dues, the fund so divided providing maintenance for both the national and State bodies. You will at once perceive that it will be necessary for each State to in turn organize its own body, having its own off-



THE WHITE "SNAIL" AND "TURTLE."

cers and its own committees charged with the various details naturally pertaining thereto, one member of which shall be delegated by the club, who shall be nominated to the chairman of the corresponding committee in the national organization for membership thereon.

"You will also perceive that this will make possible the participation of each State in the control of racing. Federal legislation, the control of national races or endurance meets and, in fact, to take up all matters of national importance bearing upon either the sport or the industry."

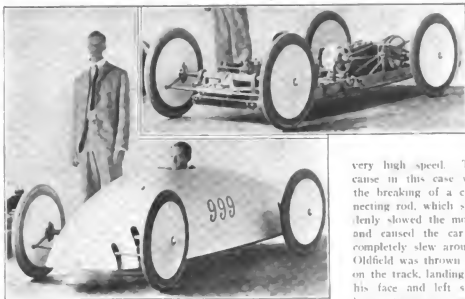
ACCIDENTS.

On Thursday afternoon there were at the track what are called preliminary races, when those who were to drive in the actual races made a number of circuits around the track to become acquainted with its turns and to test their machines out on it. Although a good many of the

thrown out and seriously injured, having two ribs on the left side broken and receiving other injuries. Schmidt was removed to a physician's office, where his wounds were dressed, and later to the Hotel Hollenden, where he was taken care of by the Packard representatives.

The cause of the accident is said to have been the breaking of the steering gear. The half mile just before the accident had been covered in 20 seconds and it is estimated that when the steering arrangement broke Schmidt was going at the rate of a mile a minute. Fortunately he had the presence of mind to immediately shut off the power, which somewhat reduced the force of the impact; otherwise his injuries would undoubtedly have proved fatal.

Almost at the same time that the accident occurred to Schmidt's machine, Barney Oldfield had a narrow escape, being thrown from his "Bullet No. 2" while going at a



THE BAKER "TORPEDO KID" WITH AND WITHOUT COVER.

drivers took part in these preliminary runs, there were never more than a few on the track simultaneously. The grand stand was occupied that afternoon by perhaps a thousand spectators.

Among the new machines entered for these races was a special racer with wind breaking shield built by the Packard Motor Car Company and dubbed the "Gray Wolf." At a time late in the afternoon this machine was given a speed test by Charles Schmidt, a Frenchman, the Packard Company's engineer and designer. Barney Oldfield was on the track at the same time, speeding the Winton "Bullet No. 2." The "Gray Wolf" had reeled off some fast miles, in 1:02 and 1:02 1-5, it is understood, when, just after passing the upper turn and out of sight from the grand stand, the machine suddenly got beyond the control of the driver and crashed through the inside fence. As the machine struck the post Schmidt was

very high speed. The cause in this case was the breaking of a connecting rod, which suddenly slowed the motor and caused the car to completely slew around. Oldfield was thrown out on the track, landing on his face and left side, but sustaining no more serious injuries than a few bruises and scratches. His speed just before the

accident is also estimated at a mile a minute. This accident, as stated, happened at nearly the same time as that to Schmidt, and it seemed likely that had it not happened Oldfield would have run into the crowd that assembled around Schmidt's machine. The occurrence gave timely warning of possible accidents to spectators, and as a result the management forbade spectators to enter the track during the race. On account of these accidents neither the "Gray Wolf" nor "Bullet No. 2" took part in the races.

Owing to the conflicting of dates with the Frankfort-on-Main races, the Spa events were postponed for a week. The new program was as follows: Weighing in of cars, September 4; 5 kilometre hill climb between Spa and Malchamps and kilometre race with standing start, September 5; contest for tourists' vehicles, September 6; obstacle contest at the Velodrome, September 7.

COMMUNICATIONS.

Massachusetts Law Does Not Require Tourists to Register.

Editor HORSELESS AGE:

In your issue of September 2, under "The Legislative Aspect of Touring," it is asserted that Connecticut is the only State making an exception to the rule that tourists as well as resident automobilists shall register and carry a license number issued by every State in which they travel.

Although the Massachusetts law is not all that may be desired, at least from the standpoint of the automobile owner or operator, nevertheless it does not require registration and licensing of tourists who are licensed in some other State.

I am enclosing a copy of the "Acts of 1903, Chapter 473," and I would refer you especially to Section 6, which has been construed by the highway commission in the manner above stated, although its language is somewhat ambiguous.

ALFRED H. HILDRETH.

Load Tests by Screw Propeller.

READING, Pa., August 31.

Editor HORSELESS AGE:

The description of the Renard fan dynamometer in your issue of August 20 leads us to believe a short description of our device for working out motors may be interesting.

We used and have been using for a number of years a screw propeller mounted in a barrel of water. This does not take up as much room as an air fan and makes a very satisfactory load for working out a motor. We know by brake tests about what speed is required for a given horse power, and in this way know whether our motors are working up to full power or not without the trouble of a brake test. The power is absorbed by the water, which gets hot enough to boil and needs replenishing once in a while. This, however, gives little trouble.

CHARLES E. DURYEA.

Fanatical Antagonism.

CAMDEN, Me., August 28.

Editor HORSELESS AGE:

William W. Justice, a summer resident at Camden, Me., is seeking signatures to the following remarkable petition:

"To the Selectmen of Camden:

"Recognizing the jeopardy to life and property from automobiles and not wishing to unjustly discriminate against them the undersigned earnestly request you to pass an ordinance prohibiting the use of automobiles between the hours of 4 a. m. and 10 p. m., with such other reasonable restrictions as have been adopted elsewhere in Maine."

My observation leads me to believe that

the horses in this township, where there is a trolley line in active operation, are much less afraid of automobiles than the drivers. Only one accident has occurred, which is said to have resulted in injury to the horse. Everyone admits that the automobilists are most careful and considerate, stopping for long periods and often leading horses by their machines. Curiously enough, the natives are much less excited than the summer residents, most of whom come from cities where automobiles are common.

I send you this petition because it is the most extreme example of fanatical antagonism that has come to my knowledge.

S.

Different Kinds of Tire Protectors.

Editor HORSELESS AGE:

In your issue of August 26 we notice an article on tire protection, which refers rather disparagingly to protectors which come in contact with the tires, as wearing them out, etc. This shows that somebody does not quite understand how some protectors have worked. Our Excelsior protector has been used by many, and it has been well demonstrated that it does not wear the tires in the least if properly adjusted; in fact, we have never heard of any tires having been worn or chafed by our protectors. The plate which comes in contact with the tire does not bear hard enough upon the tire to wear the same in the least, but simply rests gently on the tire and extracts any sharp instrument which may be picked up by the tire before it has had a chance to be driven into the tire far enough to cause a puncture. We know of many who have had our protectors on their cars for some time, and they give us most favorable reports, and many have written us that they would not run their cars without the device. We have been informed by a tire manufacturer that our device would not wear the tires enough in a season to show the slightest wear, and we have found this to be true, but in the case of some French attachments we know that the tires must show wear, as there is too much pressure allowed to be brought on the tires. This is not the case with our protectors.

HOWARD MANUFACTURING COMPANY.

[The protector referred to by our correspondent consists of a metal shoe or scraper bearing against the tread of the tire, to extract any nails, etc., which may be picked up by the tire. Our article on "Tire Protectors" referred to detachable treads—something entirely different.—Ed.]

Whitman's Transcontinental Tour.

OMAHA, Neb., August 30.

Editor HORSELESS AGE:

We are staying pretty close to the top of the hill in Omaha these days, as floods are sweeping the country. After many rains in the last three weeks it was topped off last Wednesday with 10 inches in

twenty-four hours. The railroad tracks are washed out and many road bridges are swept away. Rowboats ply in the streets and to and from residences. We shall proceed as soon as the water subsides and temporary bridges are up. Out on a prospecting tour this afternoon I came to one bridge which was being replaced and ran the automobile across on the stringer timbers before planks had been placed, the two timbers being just the right width apart for our wheels. I was granted permission to run across at my own risk.

L. L. WHITMAN.

Ignition Query.

Editor HORSELESS AGE:

I have a horizontal opposed two cylinder runabout (1902 Autocar) which has mechanical vibrator and jump spark. I find that when either terminal of the secondary circuit is disconnected from its spark plug (in free air) the opposite cylinder will run. The query is, How is the secondary circuit closed so as to operate the spark plug in the opposite cylinder? What are the connections inside the coil box? The primary circuit is grounded through the cam operating the vibrator, which is on the crank case.

The sketch shows the visible electrical connections.

A. A. O.

[The box contains only one coil, and the two terminals of the secondary winding are connected to the two spark plugs respectively, so that the spark plugs are in series with each other, and ordinarily a spark is produced in each cylinder at each revolution. If there was absolutely no leakage in the coil the spark would cease in both cylinders when one connection is broken, but there is a very strong tendency for the open circuit end of the coil to ground, even to the extent of jumping a



IN A FLOOD.

large air gap, and a small spark would jump under any conditions, as is always the case when a secondary terminal is brought close to a large conductor, even though the latter and the coil be well insulated from the ground.—Ed.]

Shipping Automobiles in Railroad Cars—Explosion Engine Queries.

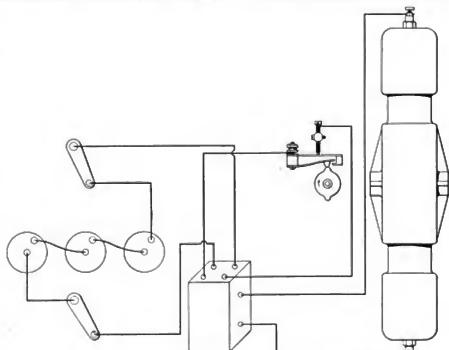
PARIS, TEX., August 31.

Editor HORSELESS AGE:

Some parties from this place made an automobile trip to Dallas and Fort Worth last week, covering something like 300 miles, but when nearly home had the misfortune to break some important part, which led them to turn the machine over to the railroad freight agent to be shipped home.

The agent placed the auto in a large furniture car without proper blocking under the wheels, with the result that the machine is practically ruined. The incident shows that everyone who wishes to ship a car by railroad ought to personally attend to the blocking of the wheels when the machine is packed into the car and see that the blocks are large enough.

At what temperature will a perfect ex-



IGNITION CONNECTIONS.

THE HORSELESS AGE

plosive mixture of air and gasoline ignite, and what is the corresponding pressure per square inch? Does it not require a higher temperature to ignite by compression than with a flame, tube or spark?

How many times will 1 cubic inch of perfect mixture expand when ignited, supposing the compression to be 65 pounds?

Would a plain steel cylinder $3\frac{1}{2}$ inches in diameter need to be jacketed?

C. E. BASSANO.

[In the Diesel engine, in which the charge is ignited by compression, the latter is about 550 pounds per square inch, which, with a charge having an original temperature of 100° , would give a final temperature of between $1,100^{\circ}$ and $1,200^{\circ}$ Fahr. This, of course, is not the minimum temperature at which a charge can be ignited, as the pressure must be high enough to allow for deviations from the theoretical conditions. It does not require a higher temperature to ignite the gas by compression than by tube or spark. When the charge is ignited the pressure is multiplied about four times; that is to say, the explosion pressure is about four times the compression pressure.]

A steel cylinder of the size mentioned would not keep cool without flanges or other radiating means. A prominent French firm used steel tubes for the cylinders of bicycle motors, the bore being about $2\frac{1}{2}$ inches, but we understand that the manufacture of these motors has been discontinued.—Ed.]

Erroneous Estimation of Grades.

Editor HORSELESS AGE:

I and a few other readers of your paper have at times in the past questioned the accuracy of claims of correspondents in your columns to have driven their motor vehicles up grades of between 20 per cent. and 30 per cent. It remained for a man from my own State to cap the climax so far, and I think it will hold for some time, with the statement near the bottom of first column, page 248, of your Touring Number, that after coming to a dead stop while in motion up a hillside, his car started again from rest, and completed the climb, adding: "I am sorry I did not have a gradometer with me, but I know it was over 50 feet to the 100 when we stopped, and I only wonder that the tires could get a grip."

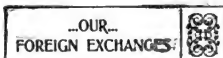
R. W. B.

Trade Literature Received.

The Graham Company, Boston, Mass.—"The Spiral Spring," by John Hector Graham.

The Continental Caomthone and Gutta Percha Company, Broadway, New York City.—Interesting Moments in Different Automobile Races in England, France, Germany.

George R. Taylor & Co., Springfield, Mass.—Baskets and hampers for the automobile and coach.



The Fuels Competition of the A. C. F.

The long heralded Concours des Carburants of the Automobile Club of France has finally taken place and has been attended by a good measure of success. The experiments were conducted at the laboratory of the club, 128 Rue du Bois, Levallois-Perret, a suburb of Paris. All of the fuels entered for competition were tested with the same motor, a single cylinder, horizontal Gillet-Forest of 140 millimetres bore and 160 millimetres stroke (5.6x6.4 inches). This motor drove a dynamo the output of which could be read in volts and amperes by means of electrical instruments. Tests were first made with what is referred to as the standard gasoline of the laboratory, and the results obtained with this fuel served for purposes of comparison. The tests were conducted by M. Lumet, engineer in charge of the club's laboratory.

The experiments cover a large range of fuels, including some which are not ordinarily used in automobiles. No difficulty was experienced with the heavier grades

of gasoline, and this led M. Forestier, who was superintending the trials carried out by the laboratory engineer, to send for some ordinary kerosene of .795 specific gravity, which he had tested with the standard gasoline and 90 per cent. alcohol, with the following result: Running at 650 revolutions, the gasoline furnished 3,695 watts, with a consumption of 1.19 gallons per horse power per hour; at 800 revolutions the pure alcohol gave 3,640 watts with a consumption of 1.225 gallons, and at 900 revolutions the kerosene furnished as much as 5,940 watts with a consumption of only 1.146 gallons. The kerosene was used with a Longuemare carburetor under the same conditions as the gasoline. The results obtained are so remarkable that it is intended to carry out further trials with kerosene, and M. Deutsch, the French petroleum refiner, has sent several samples for testing purposes.

In the table herewith the different fuels are divided into groups according to specific gravity. The consumption is given in United States gallons. The average consumption per brake horse power, with the gasoline under .700 specific gravity (71° Baumé), was .123 gallon per horse power hour; with gasoline between .700 and .715 specific gravity (71° and 66.5° Baumé), .1145 gallon per horse power

RESULTS OF FUEL COMPETITION.

Trade Name of Fuel.	Specific Gravity.	Temperature (centigrade).	Revolutions per min.	Horse power.	Fuel consumption per hour (gallons).	Fuel consumption per hour (liters).
Below .700						
Motoline—Lepretre.....	.695	23.5	1,800	10	1.29	129
			1,650	9.75	1.16	119
Essence A—Deutsch.....	.647	22	1,800	9.76	1.35	140
			1,650	9.43	1.22	129
Vaporine A—Lille et Bonnières..	.686	21.5	1,800	10	1.19	119
			1,650	9.53	1.13	119
Vaporine B—Lille et Bonnières..	.696	23	1,800	10	1.15	115
			1,650	9.05	1.06	117
.700—715						
Vaporine C—Lille et Bonnières..	.714	21	1,800	10	1.15	115
			1,650	9.21	1.05	114
Above .715						
Motoline No. 2—Lepretre.....	.718	21	1,500	9.63	1.37	143
			1,650	9.48	1.25	132
Motoline No. 3—Lepretre.....	.732	22	1,800	9.50	1.22	128
			1,650	9.49	1.08	115
Essence B—Deutsch.....	.725	21	1,800	10	1.24	124
			1,650	9.74	1.08	111
La Rapide—Cocar.....	.717	...	1,800	10.13	1.20	119
			1,650	9.86	1.09	110
Eclair—Cocar.....	.726	22	1,800	9.14	1.10	120
			1,650	9.08	1.00	111
Various Fuels.						
Luciline.....	.798	23	900	7.42	1.08	146
Carburine—Lepretre.....	.801	22.3	1,800	9.87	1.17	119
			1,650	9.12	1.05	115
Moto-petrole—Deutsch.....	.815	25	1,800	10.14	1.15	114
			1,650	9.29	1.11	120
Luminol petrole—Cocar.....	.820	22	1,800	10.31	1.39	135
			1,650	10	1.28	128
Alcohol Waters.						
Electr.—Lepretre, 50% alcohol...	.842	24	1,800	9.25	1.36	147
			1,650	9.02	1.24	137
L'Étincelle—Cocar, 30% alcohol..	.824	22	1,800	9.88	1.95	198
			1,650	9.84	1.74	172
Alcohol—Cocar, 50% alcohol....	.849	22	1,800	10.26	1.46	147
Alcohol "Volant"—Lille et Bonnières, 40% alcohol.....	.774	20	800	9.57	1.35	141
			1,650	10	1.55	155

hour; with gasoline heavier than 66.5° Baumé, .121 gallon per horse power hour; with various fuels of heavy grade, .125 gallon per horse power hour, and with alcohol mixtures, .157 gallon per horse power hour. The consumption with alcohol is thus about 28 per cent. greater than with gasoline for the same power. The power is nearly the same for all fuels, except one. The column giving the horse power has been calculated from the two columns giving the total hourly consumption and the consumption per horse power hour respectively.

The English Motor Cycle Contest.

The Auto Cycle Club, a sub-organization of the A. C. G. B. and I., during the month of August held an endurance contest for motor bicycles over routes aggregating 1,000 miles. On the first day of the contest, Tuesday, August 11, forty-three contestants started from the grounds of the Crystal Palace at an early hour, the sky being covered with clouds. The evening previous the rules of the contest had been thoroughly explained to the competitors, and the arrangements on the morning of the start therefore worked very smoothly. After some final adjustments of the competing machines, filling of tanks, etc., within the grounds, the start was made at exactly a quarter past 8, and immediately all of the contestants wheeled their machines to the entrance of the grounds in a great hurry, and there mounted and drove off in the direction of Canterbury. The management had not succeeded in obtaining permission for driving in the grounds.

Of the forty-three starters, forty completed the first day's trip, and thirty-one had returned to the Crystal Palace by 6:30 p. m. It rained for the greater part of the day, and the run was therefore exceptionally severe. On Wednesday morning forty machines started, the weather conditions being somewhat more promising. The route of this day's run was to Brighton and back, 107 miles, and included the Western Hill on the return journey. This hill is 1½ miles in length and certain portions of it are exceedingly steep. The previous day's rain had aggravated the difficulties, and most of the drivers were forced to walk and push the heavy machines up the hill. Seven of the riders, however, succeeded in negotiating the steep ascent without dismounting.

On Thursday the run was to Worthing and back, a distance of 108 miles, which was made in good weather and proved quite successful, except that a number of police traps with electric timing devices had been set, and a number of contestants had their names and addresses taken. Of the thirty-four starters on this day, thirty-three succeeded in completing the trip.

Friday's run was to Eastbourne and back, 125 miles. Thirty-six machines started, and nearly all completed the journey, in spite of the hilly nature of the road and

exceedingly bad weather. It rained almost the entire day, and some of the contestants, owing to various troubles on the road, got back very late. On Saturday and Sunday the trials were interrupted, affording a rest for the contestants, and on Monday a trip to Folkestone and back was made.

Although Monday's route was a rather long one—134 miles—the machines met little difficulty, both weather and road conditions being favorable. The outward journey particularly was made in very good time and with great regularity. Twenty-seven out of thirty-four starters finished within control time.

On Tuesday morning thirty-two riders started from the Palace for the run to Brighton and back, a distance of 91 miles. Probably owing to the shorter distance of this day's run, the aggregate showing of the contestants was better than the previous day, only four of the starters failing to finish within the time limit. Tire troubles were the greatest cause of delay of those who finished late.

All of the starters on Tuesday morning managed to be ready for the start on Wednesday morning, for a run to Basingstoke and back, a distance of 119 miles. The roads of this route were varying, but on the whole fair. Twenty-nine of the starters completed within the time limit. On Thursday morning the start was made for the run to Eastbourne and back, a distance of 125 miles, by the same number of starters as the two previous days. This day's trip was considered the most difficult of the entire series, because in addition to the considerable distance the route was hilly and contained not a few places where the surface was bad. During the outward run the weather was good, but during the return there was a heavy downpour, which added considerably to the natural difficulties of the route. This day's run included a special hill climbing contest on the River Hill, a fairly steep gradient, 3,727 feet in length. The surface of the hill was in good condition, and most of the machines had no difficulty in making the ascent, some even requiring no pedaling. During this day's run one rather serious accident occurred. One of the private owners in the contest, while on the return trip, found the road at a certain place blocked by traffic, and the speed and the distance at the time he noticed the block being such as to prevent him stopping in time, he was forced to run into the hedge, which disabled his machine. Thirty of the machines got back to the Crystal Palace in time.

The last road run took place on Friday, and was to Worthing and back, a distance of 117 miles. During this day another police trap had been set, but as the club officials had received notice of the intention of the Horsham police to time the competitors with their electric timing device, the route was slightly changed and trouble from this source avoided. The weather

Make.	Engine.	Bore (inches).	Stroke (inches).	Weight of Machine (lb.).	Best. chain or gear.
24 h. p. Bradbury.	Bradbury	2.50	3.04	140	Belt
24 h. p. Bradbury.	Bradbury	2.16	2.04	140	"
24 h. p. Peugeot.	Peugeot	2.50	2.80	114	"
24 h. p. A. P. F.	A. P. F.	2.50	3.04	120	"
24 h. p. Noble.	Noble	1.80	2.04	110	"
24 h. p. Bosh.	Werner	2.72	2.80	130	"
24 h. p. Bosh.	Werner	2.50	3.04	120	"
24 h. p. Koe.	Koe	2.50	3.04	90	Chain
24 h. p. Koe with side carriage.	Kalecom	3.36	3.48	90	Belt
24 h. p. Griffon.	Griffon	2.64	2.60	110	"
24 h. p. Bet.	M. M. C.	3.12	2.50	120	"
24 h. p. spring frame Bet.	M. M. C.	3.12	3.30	150	"
24 h. p. Kerry.	Kerry	2.5	2.5	120	"
24 h. p. Minerva.	Minerva	3.00	3.00	170	"
24 h. p. Minerva with Trismo.	Minerva	3.36	3.32	170	"
24 h. p. Ariel.	Ariel	2.16	2.04	150	"
24 h. p. Brown.	Brown	2.50	2.60	145	"
24 h. p. King.	King	2.40	2.40	120	"
24 h. p. Robinson & Price.	R. & P.	2.80	2.80	108	"
24 h. p. Grand.	Grand	2.50	2.50	120	"
24 h. p. Weller.	Weller	2.80	2.84	130	"
24 h. p. Werner.	Werner	3.04	2.57	118	"
24 h. p. Werner.	Werner	3.40	3.2	134	"
24 h. p. Werner.	Werner	2.72	2.50	120	"
24 h. p. Lago.	Lago	2.16	2.04	108	"
24 h. p. Castell.	Perabed	3.08	3.08	127	"
24 h. p. Jehu.	Jehu	2.84	2.80	120	Chain
24 h. p. Chas.	Ariel	2.80	2.80	130	Belt
24 h. p. Chas.	Ariel	3.20	3.04	130	"
24 h. p. Koe.	M. M. C.	2.96	2.04	100	"
24 h. p. Regia.	M. M. C.	3.12	2.40	140	"
24 h. p. Regia.	M. M. C.	3.04	3.32	140	"
24 h. p. Alldays.	Alldays	2.80	2.04	110	"
24 h. p. P. M.	P. M.	2.50	2.50	120	"
24 h. p. Ormonde.	Kalecom	3.08	3.32	130	"
24 h. p. Werner.	Werner	3.04	2.04	120	"
24 h. p. P. M.	P. M.	2.50	2.50	120	"
24 h. p. Ormonde.	Kalecom	3.04	3.32	130	"
24 h. p. Rex.	Rex	2.84	2.84	140	"
24 h. p. Bosh.	Kerry	2.80	2.80	130	"
24 h. p. Spark.	Spark	2.64	2.30	—	"
24 h. p. Spark.	Spark	2.60	2.60	130	"

was excellent and the roads fine, and thirty-six of the thirty starters finished.

On Saturday a series of motor cycle races were held at the Crystal Palace track. This race meet constitutes an annual fixture held under the rules of the A. C. G. B. I., and included three events, viz., one hour scratch race, a 5 mile handicap, and 1 mile time trials. For the first event there were eight entries and seven starters, for the second twenty entries and sixteen starters, and for the final event fourteen entries and thirteen starters. Some excellent racing was witnessed during the meeting, and a remarkable result was obtained, as all three challenge cups were secured by one make of machine, viz., the Hummer. Failure to observe the provision that efficient mufflers must be used on the machines brought about the disqualification of two of the most formidable competitors, viz., C. R. Collier, on a De Dion machine, who did the fastest time, 1:15, in the 1 mile time trials, with a flying start, and S. Wright, who, on an Excelsior-De Dion, scored 1:19.4-5 for the same event.

The results of these races are made a factor in the general classing of the trials. The preliminary marks show that the best results over the roads have been attained by No. 1, 2 horse power Bradbury; No. 18, 2 horse power King; No. 20, 2½ horse power Ormonde; No. 29, 3 horse power Chase;

No. 12, 2½ horse power Bat; No. 13, 2½ horse power Kerry; No. 24, 2 horse power Werner; No. 22, 2½ horse power Werner; No. 19, 2½ horse power Robinson & Price; No. 31, 2½ horse power Matchless; No. 10, 2½ horse power Griffin; No. 2, 2½ horse power Bradbury; No. 3, 2 horse power Peugeot; No. 11, 2½ horse power Bat; No. 17, 2½ horse power Brown; No. 25, 2½ horse power Lagoda.

Herz's Detachable Cable Terminal.

An improved terminal for ignition connections has been brought out by Herz & Co., of 55 Grand street, New York. The terminal consists of two parts, one telescoping the other. The inner one of these two parts is fastened to the cable end by means of a screw. The insulation of the cable is first whittled off for about three-quarters of an inch, and the strands of the bare end are then bent back over the insulation. The copper shell or inner part of the terminal is then slipped over the end of the cable and is secured by means of the screw. The cap will be seen to be provided with a circumferential ridge or corrugation about the middle of its



HERZ'S CABLE TERMINAL.

length. The outer part of the terminal is made to exactly fit over the inner part, and is slotted for connection with the spark plug. The outer part of the connector remains constantly fixed to the plug, it being only necessary to pull the cable end out of this connector when it is desired to disconnect the plug.

A New Boiler.

Decain & Henry are exhibiting a new type of flash boiler for automobile, launch and general purposes at 144th street and Southern boulevard, New York city. The boiler consists of a number of vertical sections placed side by side. Any number of sections may be used and different capacities obtained. The separate sections consist each of a lot of pairs of tubes fitted into a header at one end only, thus allowing any amount of expansion. The two tubes of a pair are concentric with each other and afford together a double passage. The different tubes of one section are connected in series with each other, while the different sections are in multiple. The whole is surrounded in a sheet iron box of rectangular shape. The boiler shown is fired with a Novelty Appliance kerosene burner. A thermostat is provided to regulate the water feed.

It is claimed for this boiler that it is absolutely non-explosible.

The Detroit Races.

On account of continuous rain the Detroit races were postponed on Monday. On Tuesday the first day's program was run off, although the track was still very heavy and the drivers were forced to keep near the outside fence where the rain had not softened the surface so much. The attendance was large, in spite of the cloudy weather. The Frenchmen were somewhat more successful than at Cleveland and the 15 mile special race, in which only three foreign cars ran, was perhaps the feature of the day. Considerable interest also centered in two races between Oldfield and Cooper, each winning one. Following is a brief summary of the different events:

First Race—Five miles open, for cars under 1,000 pounds. There were three starters and the event was won by D. Wurgis in the Oldsmobile "Pirate" in 8:23 3-5. F. Prong, Oldsmobile, was a close second, and Wigle, Oldsmobile, third.

Second Race—Five miles open, for cars under 2,000 pounds. Seven starters. Won by J. Sincholle, Darracq, in 6:05 2-5. Oldfield, Winton, second; Henri Page, Decauville, third.

Third Race—Ten miles open. Five starters. Won by Oldfield, "Baby Bullet," in 12:19. Henri Page second, by 1-16 mile; George Papillon, Darracq, third, distanced. J. Sincholle left at post on account of motor trouble. W. B. Hurlburt, Packard "Gray Wolf," dropped out at end of first mile. Page led for 3 miles before he was overtaken.

Fourth Race—Five mile handicap for Detroit Club members, cars to carry road equipment and four passengers. Won by F. C. Riggs, Cadillac, in 10:27 4-5; H. S. Pingree, Jr., White, second; W. F. V. Neumann, Toledo, third; E. L. Ford, Winton, fourth.

Fifth Race—Five mile special, Oldfield-Cooper match race, flying start. Cooper led for three-quarters of a mile, then Oldfield passed him and held the lead, winning by one-sixteenth of a mile in 5:46; fastest mile, 1:08 4-5. Cooper's machine acted badly.

Sixth Race—Fifteen mile special triangular match race, three Paris-Madrid machines; drivers, Papillon and Sincholle in Darracqs. Page in Decauville. Papillon stalled motor on start and dropped out. Sincholle drove "Great Guns," lapped Page in the eleventh and won by about 1½ miles. Time, 16:33. Fastest mile, 1:02 2-5; 10 miles in 10:49. Considering that only the extreme outside of track could be used this was furious driving. Made fastest mile of the day.

Seventh Race—Five miles, manufacturers' challenge race for cup offered by Diamond Rubber Company, of Akron, Ohio; to be won three times before becoming property of winner; already won once by Ford-Cooper and once by Winton. Cooper led from the start and won by one-sixteenth of a mile, never being in any danger. Harry Cunningham on Packard "Gray

Wolf" second, and Oldfield on Winton "Baby Bullet" third. Wurgis, in Olds "Pirate" fourth and distanced. Oldfield fought desperately with Cunningham for second. Cunningham never drove the "Gray Wolf" till two days before and got a very poor start, but passed Field and then Oldfield. Oldfield then repassed him by taking the pole on the curve in his customary style, but Cunningham went ahead again and was second by a safe margin. Time for Cooper, 5:32 3-5. The fastest mile of the race was made by Cunningham in the "Gray Wolf" in 1:04. "Gray Wolf" is freakish looking, but motor is the regular Packard four cylinder.

Race Notes.

Automobile races on the 6 mile beach at Old Orchard Beach, Me., are planned for the summer of 1904.

The State Fair Association of Milwaukee, Wis., has put up a purse of \$1,000 for a race between Barney Oldfield's "Red Devil" and Tom Cooper's "999."

In a recent race at Hartford, Biegler, mounted on a Columbia motor bicycle, won the Connecticut championship.

A series of automobile races are planned for the Nashua Fair, at Nashua, Mass., on September 7, 8, 9 and 10. The following is a summary:

First Event.—Any weight or power; 5 miles; first prize, \$75; second, \$50.

Second Event.—Any power under 1,800 pounds; 5 miles; same prizes as foregoing.

Third Event.—Any power under 1,200 pounds; 5 miles; same prizes as foregoing.

Fourth Event.—Any power under 800 pounds; 5 miles; same prizes as foregoing.

Gordon Bennett Race of 1904.

The regulations for the selection trials of British competitors in the Gordon Bennett Cup race of 1904 have been approved by the racing committee of the A. C. G. B. I.

It is provided that the trials shall take place at the end of April next, and on the 16th of that month each car entered must be produced for inspection at the Automobile Club. With each entry must be a deposit of £250, which the club will hold as a guarantee of the manufacturer's good faith in producing his car for the trials. This regulation has been made in order to prevent manufacturers entering cars for the purpose of self advertisement without any real intention of building a special car for the race.

The British team to compete in the race will be selected after the trials in April, though, contrary to past custom, the club will not necessarily select the team from the fastest timers in the trials. Engine power and the ability of a car to run at top speed for over 350 miles will be taken into consideration.



Scranton, Pa., is to have a new automobile and bicycle livery.

Two public automobile lines are soon to be put in operation in South St. Paul, Minn.

The New York Street Cleaning Department is to have two large auto trucks for hauling refuse.

The Locomobile Company of America, a New York corporation, has filed notice of voluntary dissolution.

An automobile line is proposed to run between Glen Station and Gorham, at the foot of Mt. Washington.

The Sandusky Automobile Company, of Sandusky, Ohio, is soon to open a salesroom in Cleveland, Ohio.

Seven automobiles were in the funeral procession of Fred Wild, of Denver, Col., who was buried August 29.

The bankrupt Shelby Automobile Company, of Shelby, Ohio, has filed a schedule of its assets and liabilities.

The Friedman Automobile Company, of Chicago, is hereafter to be known as the Ideal Motor Vehicle Company.

The Kamman Automobile Company, of Chicago, are planning to locate in Dulaque, Ia. They plan to invest \$100,000.

Work has been commenced upon the Eckhart Automobile Company's new factory, to be erected at Auburn, Ind.

The first meeting of the creditors of the bankrupt Shelby Motor Car Company, of Shelby, Ohio, is to be held on September 14.

The Automobile Equipment Company, of Indianapolis, Ind., has moved to a four story building in Detroit, Mich., and plans largely to increase its trade.

Banker Brothers, of Philadelphia, report sales for the week ending September 5 to Vernon B. Miller, E. H. Beck and Harry A. Houseman, all of Philadelphia.

We are informed that the Napier Company, of England, will build five machines for the eliminating trials for the 1904 Gordon Bennett Cup race.

Maj. J. Fulmer, of Los Angeles, Cal., has successfully completed an automobile tour from Los Angeles to San Francisco and back, taking in the Yosemite Valley en route.

The American Roller Bearing Company, of Boston, Mass., announce that they are equipping a large factory at South Framingham, Mass., and will soon move to the new location.

A meeting of the creditors of the Jones-Corbin Company, of Philadelphia, has been called for September 18 by the referee in

bankruptcy. A trustee is to be appointed at the meeting.

The superintendent of the union railway station at St. Paul, Minn., is planning a special stand for automobiles that carry passengers to and from the station.

The Induction Coil Company, of Milwaukee, Wis., have taken the agency for the Sia-Rite spark plugs manufactured by the Detroit Motor Works, Detroit, Mich.

R. E. Hardy, 26 Cortlandt street, New York city, has been appointed sole selling agent for the Induction Coil Company for the territory east of Buffalo and Philadelphia.

R. W. Whipple, of Binghamton, N. Y., has been requested by the Cadillac Automobile Company, of Detroit, Mich., to run one of their vehicles in the coming endurance run of the N. A. A. M.

A. A. Willey, of Bay Shore, N. Y., has bought out the Bay Shore Bicycle Company and the auto station of C. C. Higgins, in that city. He intends to establish a first class garage and repair shop.

Ernest Rouget, of Paris, France, and nephew of A. Clément, president of the Panhard Company, has taken charge of the Clément Cycle Motor and Light Carriage Company, of Hartford, Conn.

The mayors of Canton and Akron, Ohio, are working hard to persuade the N. A. A. M. to change the route from Cleveland to Pittsburgh so as to make it pass through their cities instead of Warren and Youngstown.

The Russell & Erwin Manufacturing Company, New Britain, Conn., is constructing a new building, 50x178 feet and seven stories high, two floors of which will be occupied by the Corbin Motor Car Company for the manufacture of automobiles.

A petition in involuntary bankruptcy has been filed against the I. A. Weston Company, of Syracuse, N. Y., by the Central City Brass Company, C. W. Snow & Co., and the Syracuse Supply Company, Limited. The factory of the company, at Jamestown, N. Y., has just been closed.

Warren Brothers, Room 12, Elgin Bank Block, Elgin, Ill., claim to have a patented process for clarifying and deodorizing gasoline and kerosene for automobile and other purposes. It is claimed that the gasoline treated by this process in burning produces no smoke and that it contains no water.

New England insurance companies have decided regularly to charge 50 cents for each \$100 of insurance on steam automobiles using gasoline as fuel and 25 cents on automobiles using gasoline in explosion engines. The storing of three or more machines together is to constitute a special hazard.

Exclusive right has been obtained by the Reading Automobile Company, of Reading, Pa., to manufacture the Victor, formerly the Miller, ratchet foot lever under an arrangement with James H. Bullard and the Overman Automobile Company, whose patent of March 5, 1900, it was

found was infringed by the patent under which the Reading Company had been working.

The county commissioners of Muskegon County, Ga., have adopted the following resolution: "We think it a very serious problem whether the money which the county has spent and contemplates spending on the public roads will redound to the benefit of the people at large when, as soon as a road has been improved, it is to be taken possession of by automobiles operated for the pleasure of a few to the danger of the people for whose benefit and use the public roads were intended."

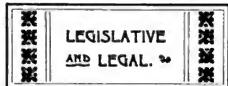
In our issue of September 2 we stated that the Fawkes Rubber Company, of Denver, Col., had opened a New York office on Broadway, near Fifty-fifth street, and that Basil S. Courtney, formerly agent for the Long Distance tires, was their Eastern agent. We should have stated the address of the new office as being near Fifty-third street, and Mr. Courtney informs us that he was manager of the tire department for the makers of the Long Distance tire, and is now Eastern manager and also general sales agent for the Fawkes Company.

The Grant solid rubber tire patent has now been definitely declared valid in France. The first decision relative to this case was rendered on November 22, 1901, in the third chamber of the Palais de Justice, in Paris, in re The Rubber Wheel Tire Company vs. Loubiere, the latter being a manufacturer at 62 rue Desrenaudes—an action for alleged infringement of the French patent No. 252,731, issued April 10, 1896, the same relating to what is known in America as the "Kelly-Springfield" tire. Loubiere appealed from this decision, leading to a hearing before the Court of Appeals, fourth chamber, where, on July 3, the former judgment was affirmed, the appellant being sentenced to pay the costs of the action.

An Interesting Experiment With Motor Cycles.

During the maneuvers which take place in England during the second week in September an interesting experiment will be tried in employing a large number of motor cyclists to keep up communication between different commanding officers and the umpire staff. Owing to the fact that the maneuvers this year will be spread over a very large area and that they are to last only a week, this means of communication is being tried to render the army more mobile. The whole of the First and Second Army Corps are to be kept in touch with each other entirely by the Motor Volunteer Corps.

The Automobile Club of Russia, which includes among its members most of the higher Government officials, has adopted a resolution recommending numbering of automobiles throughout the empire.



The Massachusetts Law.

The new law which went into effect in Massachusetts on September 1 is causing the usual amount of friction and comment. It is estimated that there are in the Commonwealth nearly 4,000 automobiles, but up to the present time only about 2,600 names have been registered with the highway commission and a large proportion of the applications received are defective, failing to comply with the law in one point or another, and have to be returned for correction.

Special interest centers around the announcement that Dr. H. C. Medcraft, of Springfield, Mass., president of the Springfield Automobile Club, will contest the constitutionality of the new law, having engaged D. E. Leary, a well known Springfield attorney, to carry the case into court for him. He contends that the law enforces double and even triple taxation, inasmuch as it compels an automobile owner to pay the regular municipal tax on personal property, a fee to the State for the privilege of running it and another fee to the highway commission for a license. The question of the extent of the power of the highway commission is also raised by the doctor and his fellow automobilists, for the highway commission has of its own authority adopted rules and regulations governing the issuing of licenses. This is also a question which will be tested before the highest courts in the State if, as the contestants expect, the case is lost in the lower courts.

Suffolk, Long Island, N. Y., has withdrawn the \$25 reward for the arrest of seorching automobile operators.

The Cedar Rapids (Ia.) Automobile Club will prosecute the Solon farmer who assaulted J. C. Pickering recently.

The Chicago authorities are arousing the ire of local automobilists anew by attempting to collect personal property taxes on their machines.

Automobilists of Omaha, Neb., have decided to protest against the 6 mile speed clause of the automobile ordinance now before their city council.

Dr. William T. Durrett, of Louisville, Ky., has filed an injunction suit against the local board of park commissioners by which he seeks to have the parks and boulevards of Louisville opened to automobiles.

Kenosha, Wis., has lately enacted an automobile ordinance fixing a maximum speed of 10 miles an hour, to be reduced to 5 on Main street. The ordinance also requires a horn to be sounded whenever meeting or passing a horse, and at all street corners.

Accidents.

A 50 horse power De Dietrich car, imported only two days before and belonging to J. J. Ryan, had both headlights wrecked and the radiator broken in a collision with a street car at First avenue and Twenty-sixth street, New York city, September 3. Mr. Ryan had for the first time undertaken to drive the machine himself, and in an effort to avoid a truck and a car going in the same direction as his machine, he darted across the tracks, only to meet a car coming from the opposite direction. The occupants of the vehicle were unhurt.

In the 10 mile open race at the Grosse Point track, Detroit, Wednesday, September 9, Barney Oldfield's "Winton Pup" burst a front tire and crashed through the fence, killing one spectator, Frank Sherar. The machine went 50 feet through the air and was almost completely wrecked. Oldfield kept his seat and had a marvellous escape, his most serious injury being a broken rib.

Nelly Brewer, ten years old, was struck by an automobile in Giffords, N. Y., on September 2, and seriously injured, her skull sustaining a compound fracture. Frederick La Roche, the owner and driver of the machine, and a resident of New York city, was held in \$1,000 bail to await the result of the child's injuries.

A \$12,000 Mercedes racer, just imported from Germany and consigned to David Bishop, of Lee, Mass., was injured by fire on September 4 while on a car float at an East River pier, New York city. The machine had just been delivered for shipment by the chauffeur, who assured the ferry officials that everything was in safe condition, and then left. Shortly after the fire broke out.

In a crash between a trolley car and the automobile of David Steele, at Tanner's Corners, N. J., on the afternoon of September 8, five people were badly injured.

Trade Literature Received.

Varley Duplex Magnet Company, Providence, R. I.—"Electromagnets," a catalogue of all forms of coils manufactured by this firm, including gas engine coils.

Woods Motor Vehicle Company, Chicago, Ill.—Catalogues of the Woods electric carriages.

Fischer Special Manufacturing Company, Cincinnati, Ohio.—Catalogue of spark coils and plugs.

Conger Manufacturing Company, 12 Water street, Groton, N. Y.—Catalogue of Stolz gasoline motors for automobiles and launches.

The North American Metaline Company, Long Island City, N. Y.—Catalogue describing metaline bearings, which are claimed to require no oil.

The Bullock-Beresford Manufacturing Company, of Cleveland, Ohio.—Circular on the Bullock igniter.

Club Notes.

A. C. A. Run to Boston and Back.

Pursuant to the favorable opinion expressed by many members of the club, the governors have authorized the runs and tours committee to organize a tour to Boston and return, September 25 to 30, inclusive, for members, their families and guests.

The start will be made from New York on Friday morning, September 25, and the following route has been selected:

Friday, September 25, New York to Hartford, 121 miles; Saturday, September 26, Hartford to Boston (via Springfield), 124 miles; Sunday in Boston; Monday, September 28, Boston to Springfield, 97 miles; Tuesday, September 29, Springfield to Lenox and Pittsfield (luncheon at Pittsfield); Tuesday afternoon and Wednesday morning, September 30, will be spent in optional runs in the vicinity of Pittsfield, the rendezvous Wednesday night being at Poughkeepsie (Pittsfield to Poughkeepsie, 60 miles); Thursday, October 1, Poughkeepsie to New York, 75 miles. Total, 535 miles.

Each day's run will be "go as you please," and members will rendezvous at the night stops in Hartford, Boston, Springfield, Pittsfield and Poughkeepsie, where ample hotel accommodations and garage facilities are afforded.

A full description of the route, which is largely over good roads; a list of available hotels, where luncheon may be had, and a list of stations along the route, where supplies may be obtained and repairs made, if needed, during each day's run, will be issued.

CHICAGO A. C.

The Chicago Automobile Club entertained the Grand Rapids Automobile Club, of Grand Rapids, Mich., at a dinner September 5, at the Chicago Beach Hotel, after a tour of the South Side boulevards and parks. On September 12 they will treat the guests of the Chicago Press Club to a similar ride and luncheon.

ST. PAUL M. C.

The St. Paul Motor Club, St. Paul, Minn., was organized on August 9 with thirteen members and the following named officers: C. L. Ege, president; F. Woods, vice president; George Hildus, secretary; and A. J. Krank, treasurer. There are about fifty riders in the city, and it is expected that the greater part of them will join the club.

A. C. A.

W. C. Temple, vice president of the Automobile Club of Pittsburg, has been proposed for life membership in the A. C. A. He is the first person to receive this honor.

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Entered at the New York post office as second class matter.

Vulcanization Without Heat.

Those who have had much experience with double tube tires are familiar with the fact that patches applied to the inner tubes with rubber solution in the ordinary manner have a tendency to come loose in time, the layer of "solution" apparently undergoing a change with age. It has also been found that it is very hard to make the patches hold when the tire is heated considerably by driving at high speed. This is due to a defect of the rubber solution with which the patch is applied. This substance is a solution of crude rubber (not vulcanized) in a solvent such as benzene, turpentine, ether or turpentine. Now, unvulcanized rubber is very much affected by changes in temperature: it is soft and elastic between 50° and 100° Fahr., becomes hard and inflexible below 46°, viscous above 212°, and melts at 340°. When a patch is applied the solvent evaporates in a short time and leaves a very thin layer of crude rubber, which is open to temperature influences as just described. A permanent repair of a puncture can only be made by vulcanizing the patch—that is, by combining with the crude rubber from 1 to 2 per cent. of sulphur, which makes it proof against all temperature influences. This can ordinarily be effected only at a high temperature, obtained by means of steam under pressure, and requires an apparatus entirely too cumbersome for the private user. If a tire is to be vulcanized it must therefore be sent to the factory or to the repair shop.

The question might be asked: Why is not vulcanized rubber used in the preparation of the rubber solution for patching? The answer is simple—vulcanized rubber has not the same qualities of adhesion as crude rubber. Two pieces of crude rubber may be welded together spontaneously by simple pressure, but this is not the case with vulcanized rubber. Moreover, vulcanized rubber is not soluble in any of the

known solvents for pure rubber, and even if a solvent should be found, after it had evaporated from the solution the vulcanized rubber would resume its original state and not hold the patch. It is therefore necessary to apply the patch in the first place with a solution of crude rubber and to vulcanize the rubber directly after evaporation of the solvent.

A French chemist claims to have produced a method of vulcanizing the solution rubber without heat, and has combined an outfit necessary for the operation, which is briefly described elsewhere in this issue. Unfortunately, the composition of the materials employed is not stated, but the process involves the use of some solution, undoubtedly of a sulphur compound. After the surfaces to be pasted together have been cleaned and covered with rubber solution, one of them is treated with a special "red" liquid, and the surfaces are then pressed together. Next a second liquid is applied to the outside of the patch, and finally a layer of powdered talc is applied to overcome stickiness. The two special liquids used undoubtedly react with each other and separate sulphur, which combines with the rubber of the pasting solution.

History Repeats Itself.

No sooner had the series of fall races begun than the experience of the Staten Island race of last year was repeated a number of times—machines got beyond the control of the drivers and crashed into spectators, killing and maiming. In the events of the last two weeks machines have crashed through the fences—both inside and outside—no less than six times, with the result that three persons were killed and a considerable number received serious bodily injuries, such as broken arms and legs, etc.

A large number of races are still to come off this fall, and the question seems to be

extremely timely: What will the authorities in control of these races do to prevent a recurrence of these disasters? We have been assured repeatedly that in a race on a closed track the spectators need not be exposed to any risk of personal injury, but the occurrences of the last few weeks rather disprove this theory; or, if it should be correct, someone seems to be guilty of criminal carelessness. That these races have practically no technical value is well established, and as a means of popularizing the use of the automobile for legitimate purposes they no longer deserve consideration when accompanied by death and destruction, when women faint in the grand stand at the sight of collisions, and when costly machines are dashed to splinters or twisted up into shapeless forms.

It may seem extraordinary that the frequency of fatalities in races should not put a check to these barbarous exhibitions, but apparently it does not. The cause of the accidents is always ascribed to some special condition, such as lack of precautions by the Government, as in the case of the Paris-Madrid race, mistakes of the driver, etc., never to the inherent dangers of extremely high speeds. Men can always be found who prefer risking their necks (and incidentally those of others) in preference to making a living by honest daily toil, and so the mad game goes on. It is quite likely, however, that sooner or later the courts will cease to pronounce fatalities on race tracks as accidental deaths and place the responsibility where it belongs, and this eventuality organizers of races must now reckon with.

On the other hand, these disasters cannot fail to give the impression to a large part of those witnessing them that the automobile is, after all, a vehicle of death and destruction. For manufacturers to encourage races when this can be the only final result seems supreme folly, and we predict that the restriction of races will soon receive the attention of the Manufacturers' Association.

French Designs on the American Market.

As reported in THE HORSELESS AGE a short time ago, the French market for automobiles has largely fallen off since the disastrous Paris-Madrid race, and it is only the enormous demand for French cars in England that has kept French manufacturers fairly busy of late. During the month of July alone nearly a million dol-

lars' worth of French cars were sold in England. As the French market, being based largely upon the boom of phenomenal racing exploits, is likely to dwindle still further, it is only natural that the French makers should look across the Atlantic, desirous of securing a larger share of the American market than they have been able to obtain so far.

The importation of machines into the United States is hedged about with many difficulties. One of the gravest defects of the present system is that the cars pass through the hands of two middlemen, one in Paris who buys the complete output of a factory for a certain period, and one in New York who sells to customers. Both, of course, demand considerable profits, and this, together with the 45 per cent. tariff and the cost of transport, raises the price of foreign cars in this country to a figure so out of all proportion with their intrinsic value that only the very limited class with whom money is no object can afford to buy them.

Hence, it will readily be seen that the French manufacturers, in their efforts to conquer a substantial portion of the American market by importing cars, are laboring under great difficulties. This they fully recognize themselves, and a number seem to have reached the conclusion that the only way they can expect to sell machines in considerable number in this country is to manufacture them here.

Efforts have repeatedly been made to organize companies on this side to manufacture under license from the foreign manufacturers, but so far these attempts have met with little success. Now, however, some of the largest French firms have combined and another attempt is to be made to establish a dependency in America, as will be seen from a letter in another part of this issue. This letter also enumerates the difficulties which are met with in exporting cars to America.

Tire Makers Not to Blame.

Since several of the recent racing disasters were brought about by the bursting of tires there is a tendency to place the blame on the tire makers. Nothing could be more unjust. It is well known that tires, no matter how well made, are always liable to go flat when the car is driven on a turn at high speed, and anyone driving at a speed so great that he cannot control his machine should one of the tires go flat or wrench off must be aware that he is run-

ning great risks. In the long distance road races it is considered a case of exceptional luck if a driver does not have to make a tire repair en route, and there is on the whole less danger of the tires being twisted off the wheels on a straight course than on a curved track. With the growing recklessness of drivers, who take turns without materially slackening speed, and with the increase in power of the racing monsters, this source of danger steadily increases.

Calendar of Automobile Dates and Events.

- September 18-24—English Reliability Trials.
- September 19—Narragansett Park Races.
- September 23—Meeting of the Association of Licensed Automobile Manufacturers.
- September 25-October 1.—Return Run of the A. C. A. to Boston.
- October 3—Race Meet at Empire City Trotting Club, Yonkers, N. Y.
- October 5.—Paris Cab and Delivery Wagon Trials.
- October 6-14—New York-Pittsburg Endurance Contest.
- October 10—Race Meet of Automobile Club of Philadelphia.
- December 10-25—Paris Automobile Exhibition.

Reform in Ladies' Automobile Attire.

The recent convention of the National Milliners' Association in the Fine Arts Building, Chicago, occupied itself with the very timely subject of woman's automobile dress, and one of the delegates, Madame Hunt, sought to create a sentiment for more aesthetic and fitting designs. According to her views, the articles at present offered to fair automobilists at milliners' and department stores, may fairly serve the purposes of long country trips, but are unsuitable for drives in the city—for shopping, visiting or pleasure riding. Articles of dress intended for the last mentioned purposes should be of such a nature as to admit of the wearer attending an afternoon reception immediately upon alighting from the car. This condition excludes all long flowing veils, and, of course, leather caps. Madame Hunt thinks that light close fitting silk hats projecting sufficiently to protect the eyes should be worn, and coats which would look as well when walking along the street, as when sitting in the car.

In a recent issue of the *Daily Mail* was described a sort of collapsible tower with stairs, built upon an automobile, and designed to be used for rescuing the endangered occupants of the upper stories of a building in case of fire. In addition to forming an escape the engine is provided with a pumping arrangement, and it is claimed that firemen are able to direct water into the rooms far more effectually than from the street.

Present Position of the Automobile Industry in England.

By J. S. V. Bickford.

The industry is making very rapid strides, and there are more than indications that in the near future there will be just such a crisis in the trade as was experienced eight years ago in the cycle industry. All sorts and conditions of men are taking up the manufacture of cars, and in nine cases out of ten it is 20 horse power cars they are going to make. This is not to be wondered at much. There is a sort of glamour over the making of fast cars which does not appertain to low powered, cheap cars, and it must not be forgotten that the average Englishman and the average American look at a manufacturing venture from very different points of view. Both in a measure want to make money, but I should say that this aspect counts for a good bit more on your side than on this. Of course I am now speaking of the establishment of a new industry, not the manufacture of well known and old goods. The Englishman is very apt to allow himself to be guided away from the more remunerative business to one which is more interesting to him personally. I know a successful steam engine builder to whom I was talking of making boat lace tags, and he said that he would rather make \$1,000 on steam engines than twice that amount on such an uninteresting thing as tags. This is quite typical of the English character, and is a powerful reason leading to the overstocking of the market with high powered cars costing from \$1,500 to \$3,000 to make, and selling for any prices that can be got. Personally I am sure this is a mistake. It is all right for those already in the business, but for anyone else to go in now is folly. As a driver I may say that my ideal car would be one of not more than 1,100 or 1,200 pounds weight, if anything really reliable could be brought out at this weight, and fitted with perhaps a 12 horse power engine. You would be able to take hills at high speed with such a car, and it is easier to run and cheaper to keep up than a high car weighing perhaps a ton and a half, to say nothing of its being ever so much cheaper to make and buy. This is, however, leaving our subject. At present, for good or ill, everyone is going in for high powered car making, and sooner or later they will feel the pinch. There are not unlimited buyers of cars for \$3,500. The really pressing demand for a low powered, cheap car is scarcely thought of. That such a demand exists can be seen by the enormous sale of light American cars in this country. There are large numbers of users of small steam cars who would jump at the chance of a really reliable English built gasoline turnout.

With perhaps one exception there is not a maker in this country, and I believe not in America either, who is following the policy of certain Continental firms, of turn-

ing out a car which shall be absolutely the best that money can make it. Such a piece of workmanship will always find a market. There is a great deal of pleasure in handling a piece of machinery where everything hidden or not is about perfection for its work. As an example I will mention the compensation of rear brakes, springs inside the leather of the clutch, springs in the steering socket connections to eliminate back lash, perfectly fitting worm and sector, absolute perfection of fitting in the valve gear so that the whole engine and gearing work more like a piece of perfect physical apparatus than a motor car engine. All this is not yet combined in any one car in this country as it is in France, but sooner or later it will be, for, as a rule, if our people have a fault in this direction, it is the result of a love for too good work. A glance at the work of the best steam launch and yacht builders will bear me out.

Faulty Distance Rod Construction.

By HUGH D. MEIER.

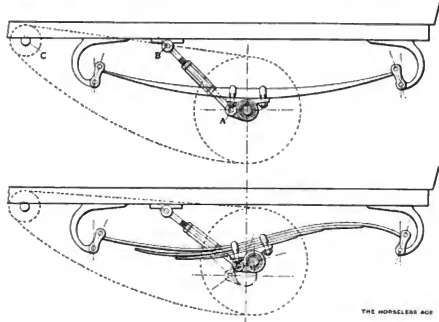
The problem of eliminating all but the normal strains in the body suspending springs of a vehicle is an exceedingly difficult one to solve. Numerous solutions may present themselves to the mechanically trained mind, but few devices are compact or simple enough to warrant their application to a motor vehicle. None of the means devised to date promises to come into general use, as the manufacturers of pleasure vehicles must ever bear in mind the appearance of their machines. Unfortunately the average would be motorist is governed largely by his own notions of what an automobile should be and is loath to recognize merit in any device which detracts from the appearance of the carriage. The builder, on the other hand, must endeavor to embody in his machines those elements of construction

which are calculated to give the results he wishes to obtain. Elements into the construction of which a considerable amount of metal must enter, lest they prove to be structurally weak, will be regarded as an "eyesore" by many automobilists, provided these elements are exposed and of unusual design. This applies particularly to axle guides, but not to distance or radius rods in general. The latter need not be very heavy and when they are properly proportioned will not attract undue attention.

Why a manufacturer should desire to make his distance rods short and hide them from view, therefore, is not clear. It is evident that the maker of the cars fitted with the abbreviated radius rods shown in the illustration proposed to hide the rods or desired to increase their factor of safety, but in doing so overlooked the many shortcomings of such links. In some cases repairmen have induced owners to have the rods of their machines lengthened out.

Reaches have been condemned by the industry for the reason that they deprive the running gear of flexibility, and as soon as they are discarded the front axle is enabled to adjust itself better to the surface of the road. In the absence of reaches, distance rods at once become necessary. These rods have all the bad characteristics of reaches as far as the rear part of the running gear is concerned. They are a necessary evil, even in their best method of application, and will be used only as long as no equivalent and better contrivance can be devised to take their place.

Distance rods are invariably provided with eyes at either end through which the fulcrum pins pass. It would be theoretically more correct to make one end of the rod terminate in a connecting rod head with separate cap and dispense with the fulcrum pin A, so that the rear axle acts as the fulcrum. For practical reasons the separate pin A is more satisfactory, pro-



SKETCH SHOWING EFFECT OF THE FAULTY DISTANCE ROD ON THE SPRING.

vided it is placed as close to the axle as possible, and provided the fulcrum B is properly located. Should the rods be arranged as shown in Fig. 1, the short arm which provides a bearing for the pivot A acts as a lever, which tends to twist off the axle whenever the spring is deflected. In Fig. 2 the axle and fulcrum pin A are shown in the position which they assume when the spring is compressed. The heavy dash dotted lines indicate the same parts in their normal position. It is well to note the position of the spring shackles relatively to the brackets in the two views, as well as the position the axle assumes relatively to its normal position. The rear part of the spring is compressed and bent by the spring pedestal, which, being rigidly secured to the axle, must tend to turn with it under the pressure of the distance rod. The forward half of the spring can offer little resistance to the action of the pedestal, and the leaves must part, as shown in Fig. 2. Were the fulcrum pin B placed so as to be in line with the axis of the sprocket shaft C, there would be so slight an angularity of the rod that the rear axle would be subjected to practically no twisting strain whatever. This last arrangement is the most popular one and has been adopted by all makers of prominence. Such long rods are in line with the strains caused by the pull of a chain, and the rods need only be lengthened out as much as the chain is to be taken up. To take up the stretch of the chain or chains in a vehicle that is equipped with short rods, it is necessary to unscrew the links a greater amount out of the turn-buckle than in the case of long rods. Long rods are also subject to practically no buckling strains, whereas the short rods are.

Were the rear axle and the sprocket shaft C on the same level, and were the fulcrum B placed in line with C, the distance rods would be arranged in the most suitable way, and practically all theoretical requirements would be met. However, this construction calls for either large rear wheels or the sprocket shaft or shafts must be hung lower relatively to the frame.

A Western manufacturer employs a bracket which is bolted to the bottom of the frame so that the fulcrum pin B and the rear axle are on the same level. But the sprocket shaft C in this make of machine is much higher up, so that the method cannot be regarded as much of an improvement as the one illustrated.

With a bevel gear drive the radius rods need not be adjusted, once they are so set that the axles are in perfect parallelism.

After October 1 the headquarters of the Women's Automobile Club of Great Britain and Ireland will be the Hans Crescent Hotel. At this hotel the committee of the club has secured for six months a large drawing room on the ground floor, which will be reserved for the exclusive use of the club and be fitted up as a reading and writing room.

Electric Cables.

(Abstract from a paper by G. Rosset presented to the Second International Automobile Congress.)

(Concluded.)

LEAD-ZINC ACCUMULATOR.

The curve of discharge of this accumulator resembles in general that of the lead-lead accumulator. As peroxide of lead is here used in the same manner, there seems to be no possible advantage from this standpoint. The only advantage arises from the fact that zinc is substituted for lead in the negative electrode, and in consequence the electromotive force is about 20 per cent. higher, but this advantage is nullified by a greater internal resistance. Other things being equal, one kilogram of zinc corresponds to 819.8 ampere hours, while one kilogram of lead corresponds to only 259.1 ampere hours; the electro-chemical equivalent is therefore much smaller for the zinc than for the lead, and this constitutes the sole advantage of the substitution.

However, the activity on open circuit on one hand, and the solubility of the zinc electrode on the other, make this cell more or less impracticable. Amalgamation may partially remedy these defects, but the electro-chemical deposition of metal during charge occasions much difficulty, which will always be an obstacle to the practical application of reversible batteries with soluble electrodes.

The electro-chemical deposition of a metal is dependent upon four variables, and if only one of them assumes a certain abnormal value the deposit of metal will possess physical qualities entirely different, and become spongy and unadherent. These four variables are: The current density, the difference of potential, the temperature and the concentration. In the recharge of an accumulator we can only control the first of these variables, and that only without being able to see what is taking place inside the cell. For those who know the difficulties of electro-chemical deposition under normal conditions there is no question about it—soluble electrodes cannot be practically employed in an accumulator.

The capacity obtained with lead-zinc accumulators should really not encourage attempts to overcome the inherent difficulties of a soluble electrode. According to very recent experiments, 331 watt hours have been obtained from a total weight of 14.3 kilograms; that is to say, $331 \div 14.3 = 23.14$ watt hours per kilogram, which is practically the same as the actual capacity of ordinary lead batteries.

LEAD-CADMIUM ACCUMULATOR.

This couple is absolutely analogous to the lead-zinc couple, from which it differs only by the substitution of cadmium for zinc, and as cadmium possesses the same electro-chemical value as zinc, this substitution does not lead to any difference in the electromotive force. The substitution of cadmium for zinc is an advantage in that

the activity on open circuit is prevented, and that a good electro-chemical deposition of the cadmium is very much easier to obtain than that of zinc. The curve of discharge is again substantially the same as for a lead accumulator, the reaction being equivalent.

Some experiments in this direction have been attempted in France by Messrs. Comelin and Viau, who sought to remedy the difficulties experienced with the electro-chemical deposition by surrounding the cathode with a wrapping of celluloid forming a succession of ribs inclined at 10 degrees to the horizontal, to facilitate the separation of the gas bubbles.

With a special construction of the supporting grids, both for the anode and cathode, with a view to reducing their weight as much as possible, the capacity obtained was 28 ampere hours per kilogram of plates in thirteen hours in one case, and 33 ampere hours per kilogram of plates in seventeen hours in another. Finally, with a core for the cathode constituted by a plate of carbon, the capacity obtained was 39.65 ampere hours per kilogram of plates in twenty-one hours thirty minutes. It is appropriate to call attention to the slow rate of discharge. The rate corresponding to the first case cited was 2.154 amperes per hour per kilogram of plates; for the second case it was 1.941, and for the third case 1.844 amperes.

That the discharges were effected at such a low rate seems to indicate that the rate of diffusion was not sufficient to permit strong discharges. Another thing to be noted is the rapid decline of the discharge curve, owing to the increase of the internal resistance of the cell in the same proportion as the sulphuric acid in the electrolyte becomes transformed into sulphate of cadmium.

But even admitting the average pressure to be two volts, and taking the greatest value given by the three discharges, we find that it takes 510 pounds of plates for a power of one kilowatt. It is only just to add that this power will be maintained for thirteen hours.

Hence, this couple, when compared with the ordinary lead accumulator, is characterized by a large capacity, but also by a small specific power, so that a battery of this kind would hardly be of use in any efforts to lighten the electric vehicle; it would only permit it to go farther, which is only one side of the question, and undoubtedly the one of least importance.

It is also well to note here that cadmium is a metal of relative rarity, the price of which is not excessive for the simple reason that its uses are limited. Its production is very limited, not exceeding 14 to 15 tons per annum in the whole world, and there are no obvious means of sufficiently increasing the production to cope with the growing demand. The exploitation of a cadmium accumulator would therefore fail industrially, owing to the want of raw material.

COPPER OXIDE-ZINC ACCUMULATOR.

This accumulator is a development of the copper oxide primary battery of La-Lande and Chaperon, the high power of which is known. The electrolyte is a concentrated alkaline solution, and in consequence the internal resistance of this cell is about equal to that of an accumulator with sulphuric acid electrolyte—that is to say, very low. The latter is a very important point. Moreover, the consumption of zinc in an alkaline bath is almost negligible, and the electro-chemical deposition of zinc in a suitable manner is very much easier to effect.

Without mentioning the inherent troubles of a soluble electrode, there is in this case still another thing to be considered—the copper oxide is not completely insoluble in an alkaline electrolyte; a little of the copper enters into solution, diffuses toward the zinc and there precipitates spontaneously, particularly during the charge, thereby causing a very troublesome local action, which results in constant consumption of zinc, even on open circuit, and the deposition of metal during charge becomes more or less defective. The use of some kind of diaphragm is only palliative, and is absolutely insufficient, as a very small quantity of copper diffused suffices to cause the trouble from local action, and the diaphragm can only retard the diffusion and not completely prevent it. Hence it is less the solubility of the zinc electrode which makes this accumulator impracticable than the solubility of the copper oxide in the electrolyte. It should be stated, however, that Michalowski has discovered an alkaline electrolyte which permits of using zinc as an insoluble electrode—a solution of alkaline aluminate. But in a recent paper by Woolsey McA. Johnson attention is called to the low conductivity of copper oxide, its poor coherence, the detrimental influence of overcharges—all things which give one the impression that copper oxide is not destined to ever play an important part in a practical accumulator. Nevertheless, this couple gives about thirty watt hours per kilogram at the rather low pressure of 8 volts; that is to say, it is about equal to the ordinary lead battery as regards capacity, but is inferior to it for retaining the charge on open circuit, and also as regards durability.

NICKEL ACCUMULATOR.

The nickel accumulator, the invention of which is generally attributed to Edison, is also the work of Jungner, and the Swedish patent is earlier than that issued to Edison. According to Dr. Konrad Norden the nickel accumulator is an evolution of the copper oxide-zinc accumulator. Owing to the disadvantages inherent in a soluble electrode, the zinc was replaced by cadmium, the oxide of which is insoluble in an alkaline electrolyte. Since then the copper oxide has itself been replaced by oxide of nickel, because, in spite of all efforts made in that direction, it has not been found possible to render the copper oxide completely insoluble in the alkaline electrolyte.

The high priced cadmium was finally replaced by iron, and the couple seems to have assumed its final form as one of oxide of nickel combined with iron in an alkaline electrolyte.

GAS BATTERIES.

There are two reasons why the attention of inventors should at present be turned toward gas accumulators. The first is the smallness of the electro-chemical equivalent of the gases available for this purpose, which results in such a high capacity per kilogram that the weight of the gas is secondary to the weight of the receptacle, forming a closed vessel for containing the gases under pressure. But it should be noted that the possibility of storing liquid air in an open vessel justifies the hope of seeing the problem resolved differently. The second reason is that as the pressure of the gas is always perfectly controllable, one of the two factors of discharge can be maintained at a constant value.

The first gas battery to be constructed was that of Grove, and from it Planté developed the lead accumulator. Since that time there have been numerous experiments in this direction, which, it must be admitted, is a difficult one. But the results obtained have not been practical. Upward produced a primary battery in which was circulated a current of chlorine, produced chemically outside of the cell itself. The apparatus was very cumbersome and of limited application; it was not reversible.

I have attempted to use chlorine under pressure obtained by the dissociation of hydrochlorate. The dissociation of this substance has the advantage of furnishing at the same time chlorine for attacking the cathode and water for dissolving the chloride formed, with the result that the concentration of both the chlorine and the chloride remains appreciably constant. Consequently, the electromotive force remains constant during the entire discharge, as well as the speed of the reaction. Such a couple, therefore, possesses a very high available capacity, which is practically independent of the rate of discharge. At the same time the weight is reduced to the minimum possible, all the material employed taking part in the reaction, including the water contained in the hydrochlorate; the anode forming simply a conductor of current, is reduced to its simplest form, consisting simply of a thin sheet of platinized silver or of graphite. A few seconds of charge suffice for the accumulator to assume its tension of about 2.15 volts and return its entire capacity. I have been able to obtain with a laboratory apparatus on a small scale 120 ampere hours per litre; that is to say, 100 to 150 watt hours per kilogram, which would correspond to a horse power hour per 5 kilograms of total weight.

Messrs. Comelin and Viau have experimented with an accumulator with oxygen and cadmium electrodes. The oxygen liberated at the anode during the charge is separated and passes in to and is com-

pressed in a receptacle independent from the cell itself, while the cadmium is deposited upon a support similar to that of a peroxide of lead-cadmium accumulator. During the discharge the oxygen is filtered through the pores of the carbon anode, to there effect the depolarization. An electromotive force of 1.5 volts is obtained. A pressure of one kilogram per square centimetre is sufficient for the oxygen, and the apparatus furnishes from .25 to .33 ampères per square decimetre of cathode surface.

Even supposing it to have reached a practical and commercial state, it would be a rather cumbersome apparatus, owing to its voluminous reservoir, and on account of the low rate of discharge, not to speak of the troubles resulting from the soluble electrode.

Otto Zoepke has made experiments to obtain lead electrodes of very high porosity to enable him to store up active gases and use them in conjunction with the active material of lead; the results are, however, of a very doubtful nature.

In other experiments along this line it has been attempted to avoid the necessity for an oxygen reservoir by taking this gas directly from the atmosphere, thus making a primary cell. I have employed to this end an ammoniacal solution of copper oxide, ammonium cuprate, to take the part of a chemical sponge absorbing oxygen from the air and liberating it in the cell for purposes of depolarization. This depolarizer is enclosed in a porous vase with a semi-permeable membrane of copper ferrocyanide, which avoids its diffusion. The zinc constitutes the soluble cathode and aluminum chloride the exciting fluid, to supplant the inevitable losses of the depolarizer in ammonia, particularly by combustion, as the reoxidation of the reduced depolarizer in contact with the air is very energetic. On account of its high internal resistance this cell will only discharge at a very low rate, a few tenths of an ampère, but it is of a remarkable constancy.

With the same end in view Prof. Wilhelm Borchers employed manganese dioxide in the presence of lime. It is known that this mixture once deprived of some of its oxygen may be reoxidized at a reasonably high temperature by a current of air. This is the principle of the Weldon process for the production of manganese dioxide intended for commercial uses in the manufacture of chlorine.

CONCLUSION.

The present investigation shows very definitely that any electrochemical couple based on a chemical reaction possesses a theoretical capacity limited by the equilibrium constant of the system, because the reaction tends toward a state of chemical equilibrium, and not toward the state of total combination. It is therefore a utopian idea to expect to ever obtain the total capacity calculated by Faraday's law; in practice one will find a limit to the speed of reaction even much more restricted than

that imposed by the constant of equilibrium, and the available capacity is in reality, both theoretically and practically, a function of the rate of discharge. It is in general not necessary to give any attention to any electro-chemical couples except those of a comparatively high electromotive force, for several reasons: In the first place, a given electro-chemical capacity gives a greater amount of energy; secondly, on account of the importance of a reasonable speed of reaction. It is well known that this speed increases with the thermal character of the reaction, that is, with the electromotive force. Consequently a large available capacity is more likely to be obtained with a system giving a high electromotive force, and on this account the lead battery seems still the most promising field of investigation, and practical experience has confirmed this view.

But the greatest future is reserved for a primary cell with circulation, because if the reacting elements are renewed and the products of reaction are removed as quickly as they are formed, a practical working stage is obtained—the electromotive force remains constant, and consequently also the speed of reaction.

Protection of the Eyes.

An interesting article on spectacles or goggles for the use of automobilists has recently been published by Dr. Detourbe, a French oculist. It has been demonstrated, he states, that the dust stirred up on the road consists not only of small particles of road paving material—mineral substances—but also contains admixtures of animal and vegetable origin, such as particles of hay, straw, and parts of different plants, which in turn are often mixed with organic constituents—microbes. Besides, small particles of rock detached from the paving stones, small insects, etc., often cause painful injuries or irritation, and for this reason automobilists are constantly exposed to the danger of inflammation of the eyes. It is, therefore, perfectly natural that protective glasses are worn.

Glasses for automobilists consist in gen-

eral of the following parts: Two contact parts which fit closely the contour of the eyes, a connecting bridge, two side walls pierced for purposes of ventilation, two glasses fitted in, and a very light frame which is secured to the head by a simple arrangement. In order that the glasses may serve their purpose without hindering the driver they must satisfy the two following fundamental conditions: They must permit an equally clear vision in all directions, and take in the entire field of vision without turning of the head, besides they must directly fit the face outlines of different persons. The frames are preferably made of sheet aluminum one thirty-second inch thick; they must be strong and light, as the total weight must not exceed 2 ounces. The glasses are secured to the head by a rubber band which easily fits any size of head. The contact surfaces, in order to secure greater pliability and adherence, are covered with buckskin, which also insures a softer contact with the face. The connection bridge, which spans the nose, must be lined. This part of the glasses, too, must be adjusted to different face formations. The air space between the inner surface of the glasses and the centre of the retina should be about three-quarters of an inch. The perforated side walls must be lacquered in a dull black, and consist of a fine mesh gauze, the openings of which are not more than .006 in.

The glasses require special attention, and may be divided into two classes—dark glasses for protection against intense sunlight, and lenses of greater or smaller focal distance for near sighted or far sighted persons. These lenses are periscope, that is, the angle of refraction is the same at the periphery as at the centre, in order to insure perfect vision in all directions.

Two automobiles are at present being built at the Germania Shipyards in Kiel, Germany. One of these is for the German Emperor and will upon completion be brought to Potsdam, where it will be used by the royal family for excursions in the vicinity, and the other for Prince Henry.

The Packard Transcontinental Tour.

(Communicated by the Packard Motor Car Company.)

The start from Wells, Nev., was made at 7:40 a. m. on July 2, with the cyclometer registering 745 miles and the thermometer showing 56°, a drop of 40° since the previous day. The power of the car seemed affected. The oil (red gas engine cylinder oil) was cold and stiff and did not feed properly. The ignition cam was also found to have been worn slow, but was readily adjusted. The oil soon warmed up. At Wells the tourists learned of a Haynes-Apperson surrey which had been shipped to Toana, about 40 miles east, by mistake on May 21, and which it was now intended to use for a stage between Wells and Ely, a mining camp, 150 miles south. A successful trial trip had been made on June 30 with G. W. Ridenour, Kokomo, as driver.

When adjusting the ignition cam the side panel of the car was left behind on the ground. Fetch ran back alone with the car, and, driving at the highest possible speed, he made 13½ miles in 1 h. 10 m.—not so bad in sagebrush. Pinion pine and scrub cedar were getting common and grew considerably higher than the sagebrush. From Wells on it was a desert, in so far as absence of water was concerned. The trail to Toana was hard to find, because the Southern Pacific Railroad was rebuilding its bed through this section, making large fills and cuts to shorten distance and moderate grade cuts. Old and new roadbeds were in several instances over a mile apart, and trails had been cut up and destroyed by the work; misleading grading camp trails had been formed, and for the time being it seemed impossible to make headway without crossing the railway tracks innumerable times and scaling a series of forbidding hills.

At a section house near Fenelon the tourists were confronted with a hill that stunned them. Two tracks led to the top, one straight and the other with a sharp bend a third of the way up, but the upper portion of both looked like vertical walls from a little distance. To go up on the



ON CREST OF HILL AT FENELON, AFTER CLIMBING A 40 PER CENT GRADE.



OLD INDEPENDENCE STATION, 6,000 FEET ABOVE SEA LEVEL.



TWO VIEWS OF GREAT SALT LAKE FROM PROMONTORY RANGE, NEAR KELTON, UTAH.

lowest gear steadily was out of the question. It was a case of jumping the car by flywheel momentum, stopping on the brakes when the momentum gave out, and jumping again. However, the attempt had to be made. Two of the occupants secured stones to place behind the drivers at critical moments, and proceeded to help by pushing. The car was jumped probably 5 or 6 feet. Quick brake action and equally quick stone action had the desired effect, though it trembled in the balance. The operation was repeated many times, the walking passengers panting for breath and all excited, but the car submitted to the strain and responded to the emergency. After a short rest the performance commenced again. The grade became a trifle easier. A few more jumps and the top was reached. The clinometer was taken out of its case, and walking back to the bottom—backward as going down a hatchway—the grade was measured at various points, placing the clinometer on the side panel of the car, which was removed for this purpose. The grade varied from 19 to 25 degrees. The average seemed to be 22½ degrees, or about 40 per cent. The 25 degrees, or 44½ per cent., was reached only for a rod or so.

Toano was reached at 1:30 o'clock, the cyclometer showing 798 miles and the elevation being 5,970 feet. On the 27 miles between Toano and Tacoma no serious difficulties were encountered, but an abundance of weird views. Ten miles out of Toano, Pilot Knob, one of the highest peaks in the State of Utah, and known to every forty-niner, hove in sight, being visible above a lower range some 10 or 12 miles to the east, but still in Nevada. Long stretches of barren, stony ground, and thousands of acres of whitelands between the trail and the low range produced the usual effect of hopeless desolation, varied somewhat in this case by the bright colorings, mostly mottled red, of the mountain sides, from which promontories shot out at intervals. Toward Tacoma again more sand and more sagebrush. Near the town the ax—usually strapped on top of the re-

serve gasoline tank in rear—was first made use of. It served to clear the "road" of some uncommonly stout sagebrush stems which refused to yield to the usual method of mowing them down by the weight of the car. The arrival at Tacoma was recorded as at 4:25 p. m.; cyclometer, 825. Fifteen gallons of gasoline were taken on board here, the supply having dwindled to 2 gallons, which was about as low as it ever was allowed to run west of Denver.

The start from Tacoma was made at 5:45 a. m. July 3. It was attempted to cut the way short and avoid the disagreeable travel near railway grading camps, where heaps of tin cans, boards with nails in, and all kinds of offal increased the chances of tire puncture. An impassable ravine, however, made it necessary to turn back, and the trail was crossed about 15 miles from the start. Going back toward Lucin station, only 11 miles from Tacoma, some bad sand had to be crossed. It was so deep and loose that the car occasionally sank down till the differential case dragged. With full power the car could have pushed the sand aside, brush and all, but out of three revolutions of the drivers probably only one was good for traction, while the other two served to pack the sand a little so the tires could take hold. Here, as well as near Wadsworth and Winnemucca, this slipping of the drivers in the sand doubtless raised the cyclometer record somewhat above the actual mileage. Including the detour, the record advanced from 825 to 852 miles before Lucin was reached. Two miles west of this insignificant station the railroad branches off southeasterly to cross Great Salt Lake and save the great curve by way of Promontory and Enterprise. Drinking water is scarce at Lucin, but by depositing a half dollar piece on a shelf in a nearby shanty it was found possible to produce a different beverage gratis at some distance from the place of deposit. The inference was that the railroad favored restrictions on the sale of spirituous liquors near its camps.

Anyone who may try in future to drive an automobile from Lucin to Terrace (cy-

clometer, 875) will remember the trip afterward. Gullies cross the trail about every 100 feet, into which the front wheels must be lowered cautiously, and then there is danger of driving the headlight against the opposite bank. Then the rear wheels must be nursed down into the ditch, and if the latter is not very broad that means that the front end of the car must simultaneously be nursed up on the other side. Then, when the rear wheels are safely down, the whole car must be shot up by flywheel momentum, and if the two banks don't happen to be parallel this means a very energetic use of the steering gear, too, so as to have both front wheels in contact with the ground, and not one of them lifted into the air while the other is twisted around scraping against the point of the boot. This series of operations, repeated about fifty times per mile for 23 miles, leaves an indelible impression on the memory, or sore spots on the driver's hands, and a very lively realization of the fact that a car to go across such country must have highly flexible running gear and several other qualities.

With the car standing on its nose in one of these gullies the gasoline ran out of the float chamber of the carburetor and back to the tank in the boot. To start, it was necessary to switch in the little 1 gallon emergency tank provided for just such cases, close to the carburetor in the rear. The incident suggested the advisability of having a half pint trap for gasoline near the carburetor in all cars.

Terrace was reached at 11:30 a. m.; elevation, 4,548 feet; distance by rail to San Francisco, 709 miles. The cyclometer distance was 875 miles. Distance to Ogden by rail, 124 miles. The road to Kelton was mostly level, over white alkali land, and Kelton was reached at 1:30 p. m.; cyclometer, 905½; temperature, 76½; elevation, 4,224. The driving was easy and the white Salt Lake marshes were constantly in view to Lake Station, where a spur of the Promontory Range must be scaled. The railroad makes a wide detour around it, but leaves no room for a

wagon track. Many railroad men assembled to see the car climb the grade, which looked very much like the 40 per cent. hill at Fenelon. It was perhaps not quite so steep for all its length, but, on the other hand, the footing was impaired by loose stones, which once dislodged rolled all the way to the bottom. The method adopted to scale this hill was the same as at Fenelon, and with the same gratifying result. The mountain has three crests and the first summit was reached from 5:30 o'clock till 6:01, and it was just 8 o'clock when the car arrived at the historical railway village known as Promontory, where the engineers of the Southern Pacific, building east, and those of the Union Pacific, building west, met on May 10, 1869, completing the first transcontinental railway. Cyclometer at Promontory, 939; gasoline consumed July 3, about 8 gallons; lubricating oil consumed since leaving San Francisco, 5 gallons.

Some Electric Mileage Records.

A number of very creditable runs in an electric car have recently been accomplished by Arthur C. Newby, of Indianapolis. The car is a Model 100 of the National Motor Vehicle Company's manufacture, and is employed by Mr. Newby for private use. It weighs 1,600 pounds, of which 800 pounds is battery. The battery consists of 44 cells and is made by the Western Storage Battery Company, of Indianapolis. The same model of car is now equipped with thirty-six cells of larger size. The following information of long trips accomplished on a simple charge was furnished to a representative of THE HORSELESS AGE by Mr. Newby on the occasion of a recent visit.

The car was put out July 1, 1902. After it had run a total of about 200 miles it made the first record run, a distance of 82 miles, on one charge upon smooth city streets. On August 21 of this year a total mileage of 118 miles on one charge was made on Indianapolis boulevards, but the best accomplishment of the car so far, in Mr. Newby's estimation, was a run over country roads from Indianapolis to Richmond, Ind., a distance of 69½ miles, without recharging. Up to August to the vehicle had made a total mileage of 6,100 miles. It was ten months before the batteries required washing, and the repairs for this period did not exceed \$12, excepting a set of new tires, which was put on after about 4,000 miles. The expense for current for this car at Indianapolis rates is said to be 1½ cents per mile.

The Portuguese Government has granted a concession to the Conde de Vizella for fifteen years to run an exclusive automobile service on the various roads in the districts of Luanda and Lunda, in Portuguese West Africa. The Government, however, reserves a preference to establish other automobile services in the same districts under certain conditions.

COMMUNICATIONS.

A Bit of Experience.

Editor HORSELESS AGE:

For the past three years it has been my good fortune to own several makes of automobiles, both steam and gasoline, and operate them over the uncertain road surfaces of the good old State of Vermont, and while on the whole my experiences have been varied enough to dispel any thought of monotony I am well satisfied with the ratio of pleasure to trouble that Dame Fortune has favored me with.

But there are times—I may say trips—when one trouble seems to follow another so rapidly that everything annoying appears to come my way. It is one of these trips that I want to call attention to in this article; not that it may discourage any prospective owners of automobiles; neither that it may unduly inflate with vanity any of those who already own and operate machines, nor yet to furnish especially delicate morsels to that omnipresent faction of the automobile world, the critic, but simply to show what can happen in a short trip to an ordinary mortal who does not feel himself exactly a novice at the business.

To give the incident setting, I might say that during the summer of 1902 I successfully operated a toning car of well known make, the power of which was furnished by a two cylinder vertical motor rated at 16 horse power, and it is no more than due the builders to say that throughout the season the car gave me very little trouble, and I considered it a very satisfactory investment. But during the winter months, when automobile navigation is decidedly closed in this section of the country, I could do nothing in the automobile line but read, think and dream. So it was an easy matter for me to see a great many points where my car, now a season old, was lacking in up to date equipment, and still easier to convince myself that I had several very valuable improvements under my hat that I could readily apply to my carriage. So, as I had a good warm place to work in, and a machine shop right handy, my man and I spent some of the most enjoyable hours of my brief existence in putting some of these notions into cold metal and attaching them to the machine.

After the car had been tried out in the spring and a few retrograde changes made, the Automobile Club of Vermont (of which I am the unfortunate secretary) pulled themselves together a bit and appointed a day for their first run. Of course there were the usual postponements, but the day came at last, and there were very many reasons why I should participate in the event.

The Mecca of the run was only 50 miles

from my home, and I suppose the insignificance of the distance made me careless, which condition, coupled with the fact that a new set of wheels and tires arrived at the eleventh hour, might have had something to do with the lamentable fact that I started away without taking scarcely any of the automobile's necessities of life.

We got the wheels on, and one of us gave them a coat of paint while the other was filling the gasoline tank. We finally got away, three hours later than we had planned. All went fairly well for the first 15 miles, which was over rather sandy roads, but the new lubrication system did not get adjusted just right for some time. Then the cooling water began to show a tendency to leave us in a vaporous state, and at Claremont Junction we ran into the hotel yard to get some water and tighten the pump belt.

In backing out of the yard I found that I could not release my reverse clutch, so had to stop the engine in a very sunny place in the road. Investigation showed that the ball thrust bearing on the reverse rod had unscrewed and let the balls drop out; so the lever failed to act. I now took a little recreation in a search along the sandy, sunburned, dusty road over which we had just passed, with my nose nearer the ground than convenient, looking as foolish as any dog that has lost the scent on a cold trail, but it enabled me to find enough of the balls to warrant the hour and a half of exasperating work it took to replace them.

So we found ourselves two hours and a half more to the bad, but with a sigh of relief, as I felt the engine respond to the crank, I settled myself together to make up lost time. But we had not much more than got the car under way when things came to a sudden stop; that is, excepting the occupants, who did not stop quite as quickly as they desired. I might have looked wise, but I surely did not feel it. I tried the crank, and it would not turn. Something surely must have let go inside the crank case, and that meant something I did not like to think about.

But just then a ray of hope came to me, in the form of a recollection of one evening when the engine stopped in the same way and I broke the starting chain before I found the trouble, which was the turning back of one of the caps on the change gear case, which in so doing binds against a coupling on the engine shaft and holds it tight. A look at this cap found it tight sure, as all efforts to loosen it with anything but a hammer and cold chisel failed, and I finally had to chip it out piece by piece, which wasted another half hour.

And now it began to look like rain, but this time we got under way, and setting my governor up a notch or two, we began to gain time amazingly. But after a few miles the water began to heat again, and we stopped to tighten the pump belt, and found to our dismay that we had no belt to tighten. As luck would have it, we

found enough under the seat to make one, but had no proper fastenings, so for the rest of the trip we stopped and looked at that belt every few miles to see if it was there, and if there, to see if it was tight.

It now began to rain in torrents, and among other things I forgot to take was anything in the way of protection from a storm, so we were finally driven to abandon the machine and take to cover in the woods nearby. Suffice to say, I recall the sensation of getting back onto those wet leather covered seats, and can still feel the cold garments as they were readjusted by the seating process; so that later, when we took in two showers on the way, we simply kept on and let it soak in. The roads were now all afloat, and if we did not fly, the mud certainly did, and on a hill just before I reached the hotel both my forward clutches slipped, and rather than get out in the rain to tighten them I turned around and backed up the hill, much to the enjoyment of the natives. My spark plugs had seen their best days, and were now beginning to catch the general distemper and take time off or strike for a shorter day, I do not know which, and of course I had left at home the ones that should have taken their place.

We reached the hotel on one cylinder and the high speed clutch holding indifferently, and then submitted to the humiliation of being pushed under the shed by willing hands. I thought as I went into the hotel that I had had my share of trouble, but events seemed to prove that I had lots more of it coming my way before I should see home.

The jolly crowd at the club meeting and the business and pleasure of it made me forget my troubles, and it was only the next morning, when the return trip was to be made, that they began to come back to me. As my home was so much nearer than that of the other members, I waited to see them off, and it was nearly 2 o'clock when we got our coats off and began business on our machine. First, we fixed that pump belt so that it stayed tight; then renovated the old spark plugs and gave them a brace that we thought would last them a while, and after tightening the clutch all around felt that we

were ready to start; but the turn of the crank showed that only one cylinder was yet in commission, and after an exhaustive search I found that the trouble was in the trembler, the points of which were also cleaned and adjusted.

We started off and ran across the yard to where gasoline was to be had, and filled my tank, which holds twelve gallons. I started the engine, and was just about to step in, when there gushed from under the seat a small Niagara of gasoline. As I afterwards found, owing to a flaw in the copper a crack had developed in the side of the tank about 2 inches long. I managed, with the help at hand and a number of pails, to save all but about two gallons, and then we had to take the body apart in order to remove the tank, which was sent up to the plumber. While he was at work on it we stole time enough to get some rather cold comebacks for dinner, as it was now about 2 o'clock. As a matter of principle, I called up my home on the 'phone and told them to cancel any engagement I might have for the rest of the week—that my return was indefinitely postponed for reasons beyond my control.

We then installed the tank, and getting the body together, made another attempt to get away, which took us to the hotel door, when one cylinder stopped again. After going through everything we found a broken inlet valve, which was replaced, and we were enabled to get out of the city limits. When ascending a hill we found ourselves on one cylinder, as usual. This time it was a trembler that had broken. We then went over everything we could by the wayside, having got far enough away from the metropolis so that there was no one to annoy us except the mosquitoes.

It was now 5 o'clock in the afternoon, and with that grim faith which a gambler has, that his luck will turn sooner or later, I took my seat at the wheel. If I had only had two good spark plugs I am sure I could have made home without a stop, excepting for supper. As it was, one of the points on the spark plug in the rear cylinder would heat and drop away from the other about every 50 feet, and we would have to take it out and pry it up in

place again, so that our trip was a little interrupted. But we arrived home in the evening with our faith in the motor vehicle in a large measure restored, but somewhat shaken in ourselves as to our ability to make a trip without a better equipment of necessities under the seat.

I suppose this is the kind of an article that the manufacturers say hurts the automobile trade, and in justice to them I must admit that this machine had been tinkered with by a novice (?) and was a last year's model; and yet, in justice to myself, I must state, that aside from the gasoline tank and the fact that I did not have decent spark plugs, the other sources of my troubles were just as they were sent from the factory, plus a season's use.

We readers of your valuable publication sometimes think that the experiences of our friend, Mr. Damon, of Salem, are rather one sided, but I do think he hit the nail on the head when he said that because a machine runs 1,000 or 1,500 miles without giving trouble, it is no sign that it never will, as from 2,000 to 3,000 miles is the time when a machine begins to show its defects. And again, I do not believe that Mr. Damon's experiences really differ so much from those of the rest of us—the difference is in his frankness in expressing his real experiences. PITHIAS.

Motor Farming.

NEW BERLIN, N. Y., September 11.

Editor HORSELESS AGE:

I am mailing you under separate cover two photographs which show what we can do with the auto up here in the country.

I. L. RICHER.

The Age of Organization.

Editor HORSELESS AGE:

A while ago a body of promoters evolved a scheme to control the automobile market by a combination. The promoters will try to secure money for themselves, for which they will render no useful equivalent.

Now there seems to be a company of promoters to prevent the first company from accomplishing this object. These latter will want to secure some money for



MOTOR HAYING, OR THE UP TO DATE FARMER.

themselves, for which they will render no adequate equivalent.

There is reason to believe that the suggestors of these two companies were at least friendly.

The first organization threatened suit upon the Selden patent, and when their "bluff" was called contented themselves by threatening the customers of their rivals with suits for infringement by circulars and advertisements which contain statements which they cannot but know are, substantially, mendacious. This kind of circular has been condemned by the courts, and is the usual resort of those who doubt the justness of their contentions.

The proposals of the so called "Guaranty Company" to defend the suits contemplate a sufficient amount of money to pay the attorney, and in addition a good deal of money for themselves. Very little or no liability is assumed. An amount of money down is required and a quarterly payment that would amount to the sum alleged to be risked in about three or four years.

When the first company buys out the second it will have to pay more than it has had to pay to end oppositions before, because now it has to deal not with a manufacturing concern but with a speculative concern.

If these people succeed with their schemes the automobile art will be saddled with a very great burden. For just as sure as anything can be the manufacturers will have to pay the score.

E. J. STODDARD.

Satisfaction at Last.

Editor HORSELESS AGE:

Since my last letter I have acquired, in the somewhat expensive school of experience, some further information in matters automobile which may possibly interest some of your readers.

After disposing of my fifth automobile I failed to find a machine that exactly came up to my requirements, and therefore, while awaiting something better, bought one of a very popular type of single cylinder light gasoline runabouts. While I was very much impressed with the skill displayed in its design I was forewarned by the experience of others and my own observation that in some mechanical details of construction it left a good deal to be desired.

Before using it, therefore, I had it taken apart by an expert mechanic, studs removed where possible and replaced by bolts, all single nutted bolts removed and replaced by longer bolts with double nuts, and light material wherever possible replaced by stronger stuff. After a little use I found that it was underpowered, but by enlarging the cams which actuated the inlet and exhaust valves I obtained much greater power and was very well satisfied with the performance of the machine when its use was restricted to the work for which it was probably designed—that is to say,

for use on good roads and easy grades. I had the usual minor annoyances of the road, but nothing at any time that prevented me from reaching my destination. I infer, from the description given, that my machine is of the same make as that described in a recent issue of your paper in a letter from Belfast by a subscriber whom it always reminded of the "Ode to Phyllis," which he quoted, and I quite agree with his conclusions. It is perhaps fair to add that the manufacturers of the machine are themselves gradually correcting many of the defects pointed out in the Belfast letter, and that the machines which they deliver today are a great improvement in many respects on those turned out when mine left the factory.

Finding that this machine was somewhat light for my use, in the spring of this year I bought another machine of a somewhat heavier pattern, although of the same type—single cylinder runabout of quite heavy construction, with three speeds. This machine was my first practical experience with the contact spark, and my impression of this kind of ignition gained from its use during two months is distinctly favorable.

I had no occasion to interfere with the adjustment at any time, and on the few occasions on which I had a little difficulty in starting I found that the trouble lay in the supply of gas.

After using it for two months I found, however, that the machine made too much noise and vibration to be entirely satisfactory, and as I had found from previous experiences that the best time to dispose of an automobile is while it is still new, I sold it for the best obtainable price.

Having put to the proof seven machines and found them all wanting, I began to reflect seriously upon a remark made by an acquaintance to the effect that he had wasted a great deal of time, money and patience upon American machines, but had not known anything of the real pleasures of automobiling until he bought an imported machine, and I almost reached the conclusion that I must either retire from the sport or try to find an imported machine for sale at a moderate price.

Before choosing either horn of this dilemma, however, I decided to make one more trial of domestic machines, and bought my present car.

This car has such strongly marked features that if I were to give any description of it, however short, its name would be known, and if I were to state at length my opinion of its merits and give the reasons upon which it is based it might be thought by those ignorant of the facts that I was in some way connected with the publicity bureau of the manufacturers. It will, therefore, be sufficient to say that it fulfills all my requirements, and that, although it is not quite perfect, it serves my purposes better than it would if it were perfect; for if such were the case I should be obliged to deny myself the fascinating

pastime of devising and trying improvements, and until it wears out I shall not be in the market for another machine.

Meanwhile, remembering how Mark Twain, by sending a courier up and watching his progress through a telescope, enjoyed the thrilling experiences of an ascent of the Alps without suffering its annoyances and pains, I shall enjoy the accounts given in your columns of the adventures of others, and hope that Robin Damon and others who favor us with letters will persevere until each reaches the defensible land which lies before all who possess satisfactory automobiles. VIATOR.

French Manufacturers Looking for American Concessionaires.

PARIS, France, August 5.

Editor HORSELESS AGE:

As official delegate of the export department of an association of leading automobile manufacturers in France, I wish to bring to the attention of your readers the following:

Our vehicles have successfully participated in speed and endurance contests, and have gained awards in all classes, particularly in the long distance contests, in which they have shown up most creditably. We manufacture small voiturettes from 6 to 10 horse power, light cars from 10 to 14 horse power, and large cars from 14 to 60 horse power, including delivery wagons, trucks and omnibuses. We also manufacture motor boats for pleasure and racing, and hold the world's speed record for boats driven by gasoline motors.

From a commercial standpoint, we have been equally successful; our annual production attains nearly 1,000 vehicles; substantial dividends have been paid to our stockholders and a considerable sum has been placed to the reserve.

In exporting our motors and vehicles to the United States we experience difficulties for the following reasons: (1) On account of the distance; (2) transportation charges and tariff duty considerably raise the prices; (3) the middlemen in France often exact unreasonable discounts; (4) at certain periods the demand exceeds our production and leaves us no time to cater to the demands from new fields.

We desire to place at the disposition of some American firm our experience in this line, to establish in America works for the construction of automobiles according to our design, with the co-operation of our technical department. We are in position to ship to America the parts of the motor dismounted, or the motor complete, together with all the separate pieces and accessories of the chassis, permitting the assembling to be done rapidly and thoroughly, without any experiments, and automobiles to be placed upon the American market either with or without our trademark, in small or large quantities, at uniformly low prices.

The second proposition is of a larger scope, but makes those interested more inde-

pendent; it provides for the establishment of a complete factory for the manufacture of motors and complete vehicles, according to plans, designs, models and fittings furnished by us, which would permit the manufacture, with the same certainty as in France, of vehicles identical with ours, without study or experiments.

In either case we would send a number of our best workmen to construct the first vehicles, and to coach the employees of the new works. This is a most important point. Several months would suffice to get the works on a regular working basis.

M. B.

Most Effective Demonstration of Cars.

Editor HORSELESS AGE:

Mr. Dill's remark, on page 269 of your issue of September 2, to the effect that his "trip was taken to show that the best and most honest test for an automobile is to run them where they will have to stand work and show what they are good for, instead of over macadam roads or up the Hudson, or from New York to Boston," contains much good sense. A recent selling trip into the mountainous portions in the western part of this State brought out the same sentiment very frequently. The people in that locality protested that no vehicle would do their work, and the only way to convince them was by ocular demonstration. People who would not accept the report of any contest committee were obliged to accept what they saw demonstrated, and it is on this account that practicability contests should be held in front of the spectators. There is no way to accomplish a desired result except by keeping everlastingly at it, and I therefore wish to put myself on record once more as favoring a reliability contest held in some selected spot, adjacent to a large city, where all varieties of roadway can be secured and where the spectators can, hour after hour, watch the vehicles being driven over both good and bad roads, including artificial mud holes (if necessary), sand and hills, until they are convinced as to which vehicle best meets their needs. Such a contest will make sales and will prove to the public the one thing they now so frequently doubt, viz., the practicability of the vehicle. While vehicles have been driven across the continent and through all kinds of stormy weather, like the New York-Buffalo run of two years ago, such feats fail to produce the conviction that an ocular demonstration does, and it is not enough that spectators along the road should see the vehicles go by nor that newspapers should chronicle the event. It is most desirable that prospective purchasers should be given opportunity to see for themselves repeatedly the performance of the various vehicles over roads as bad as are met with in their respective localities. Such evidence is convincing, and it is the only kind that is absolutely so. In this connection

let me urge the abandonment of both the inside show and the endurance run, and the substitution thereof of an encampment held during August or September, just as a fair is held, but with races and endurance runs as well as the exhibit for the attraction. Such an arrangement will accommodate the exhibitors better than any single building like the Madison Square Garden can possibly do, and it gives a live exhibit with vehicles in motion instead of a still one in the badly ventilated, enervating, smoky atmosphere of an enclosed building.

CHARLES E. DURYEA.

Lameness in Finger and Tiller Steering.

Editor HORSELESS AGE:

The possibility of the development of a permanent injury induces me to write you regarding a personal experience with a form of lameness in the third finger of the left hand, which seems to be dependent upon the employment of the tiller steering mechanism of my automobile. The condition developed soon after the beginning of the use of this form of steering device and has proven quite resistant to remedial measures. It seems reasonable to regard it as due to injury inflicted by the end of the tiller engaging in the palm of the hand incident to certain movements in guiding the machine. The condition induced could easily be mistaken for a rheumatic affection of the second joint of the ring finger. There are doubtless many others who have had the same trouble, and, judging from my own experience, are likely to have it for an indefinite time. A lady contributor to your paper casually refers to the incident of a lame finger on the left hand early in her experience with what I assume was a tiller steering machine. It is very desirable that the subject should be carefully studied, and, if the facts warrant a conclusion against this form of steering device, that the matter should be brought to the notice of the manufacturers. To this end the undersigned would appreciate the records of any persons who may have been unfortunate enough to receive injury in the manner indicated.

B. FRANKLIN STAHL, M. D.

Explosion Engine Query.

Editor HORSELESS AGE:

What would be the effect of using for the compression space an inlet port running parallel with the water jacketed cylinder and extending for the entire length thereof, of such dimensions as to give the proper compression space? The igniter is to be placed at the end of the port next the crank case.

THE CLARKMOBILE COMPANY.

[The engine would be less powerful and less economical than an engine otherwise identical, but having a cylindrical compression space adjacent to the space swept through by the piston. The reason is that a narrow longitudinal passage would have

much greater wall surface for a given cubic volume than a compression chamber of the usual form, and much more of the heat energy developed by the explosion would be radiated through the walls. The compression chamber should theoretically have a nearly spherical form, as of all geometrical bodies a sphere has the least wall surface for a given cubic volume, and many manufacturers make the cylinder heads semi-spherical.—Ed.]

The Auto Vulcanizer.

G. A. Le Roy, a chemist of Rouen, France, has devised a method of vulcanizing the rubber of the solution used in making repairs to both inner and outer tubes by means of certain chemical substances, without the application of heat, and has placed upon the market an outfit comprising all the different materials and tools required in making the repair. The outfit comprises the following parts: A tube of rubber solution for pasting on patches, a tube of rubber solution for filling up cracks, cuts, etc., in outer tubes; a bottle of liquid for cleaning the surfaces to be pasted together; a bottle of a vulcanizing liquid; a bottle of a liquid to complete the vulcanization; a tube of talc, rubber patches, pincers and brushes, etc. The method of effecting a repair and vulcanizing same by this process is as follows: Patches are made preferably from old inner tubes, red rubber containing sulphide of antimony, being the best for the purpose. The surfaces to be pasted together are cleaned with emery cloth, and with the cleaning liquid furnished with the outfit. Next the surfaces are given a coat of rubber solution, and then one of them is treated with the vulcanizing solution. The patch is then put on and pressed tight to the tube. Finally the liquid which completes the vulcanization is applied to the outside of the patch, and the whole then covered with talc to prevent stickiness. Preferably, after the patch is applied, rubber solution is squirted by means of the spout of the tube all around the edge of the patch to cover the joint between the patch and tire, and is then also treated by the vulcanizing process.

The effectiveness of the vulcanizing process may be tested in the following manner: Two patches are pasted to the tube, one by the ordinary process and one by this special process. If the tube is then placed in hot water the first patch can be readily detached, while it is impossible, so it is claimed, to detach the patch which is vulcanized, and if great effort should be applied the rubber will simply tear.

The 80 horse power Mors racer which won in the Paris-Bordeaux race has four cylinders of 145 millimetres bore and 175 millimetres stroke (5.873 inches). The carburetor has one float chamber and four spray nozzles, one for each cylinder.

NEW VEHICLES AND PARTS.

Some Features of the Clement Cars.

In a recent issue we described the four cylinder Clement motor, and now present a number of illustrations of the chainless

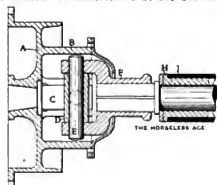


FIG. 1.

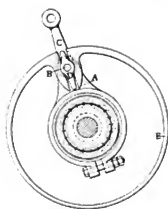
driving gear, the brakes and the steering knuckle.

A peculiarity of the drive is that only a single universal joint is used in the drive shaft. This has been made possible by a special arrangement of the rear axle casing. The single universal joint is built together with the transmission brake drum, as shown in Fig. 1 herewith. From the web A of the brake drum projects a second drum B, which is provided on its inner surface with two opposite longitudinal slots. In these slots are arranged two sliding shoes C C', in which is pivoted the crosspiece D. The latter is drilled at right

angles to the pivot axes in the sliding shoes and has pivoted to it by the pin E the forked piece F. The hub or sleeve of the latter is provided with a square opening, into which is fitted the squared end of the transmission shaft. Just inside the squared end the transmission shaft is surrounded by a bronze sleeve H secured within a steel tube I, forming a casing for the transmission shaft. At the other end this tube is secured in the differential casing. It will thus be readily seen that the tube I takes up the torsional reaction of the bevel gear drive and dispenses with the necessity for brace rods or a special brace tube, as used with other bevel gear transmissions.

Fig. 2 is a section through the driving gear, differential and rear axle casing. The driving shaft A passes through a sleeve B of phosphor bronze into the casing on the rear axle enclosing the driving gear, where it has keyed to it the bevel pinion C. Back of this bevel pinion is placed a ball thrust bearing to take up the end thrust. The differential gear is of the spur type, and is enclosed very compactly in a casing D in two parts. These two parts are provided with flanges by which they are bolted together, and between the flanges is clamped the bevel drive gear E. The inner ends of the divided rear axle F F are squared and fit into square openings in the central gears of the differential. It will be noticed that the hubs of these gears fit into counterbores in the casing of the differential, so that the axle halves may be withdrawn and reinserted without taking the casing apart.

Each half of the differential casing is provided with a tapering hub of considerable length extending outwardly from the casing. Over these hubs are forced two steel cones for the ball bearings in which the rear axle runs. The cups for these bearings are screwed into threads on the main drive gear casing. By this means any wear of the ball bearings may be readily taken up and the mesh of the pinion C and gear E adjusted at any time, an opening in the case G, closed by a plug H, being provided for observing the adjustment. After the cups are in place hubs K K are



THE HORSELESS AGE.

FIG. 3.

bolted to the casing in which the tubes J J forming the rear axle sleeves are secured. The driving gear casing G is in two parts and is of cylindrical form, the parts being fitted together by means of a checked joint and bolted flanges.

The outer end of the rear axle tube is surrounded by a sleeve L, the outer end of which forms a casing for the outer rear axle ball bearing. The casing for the ball bearing is partly separated from the sleeve proper and is slitted at a certain part of its circumference, being provided at both sides of the slit with a lug drilled to receive a bolt. The object of this arrangement is to permit of clamping the ball bearing in place when once adjusted. A grooved collar is secured upon a conical portion of the axle and serves as a stop for the hub of the wheel. The balls of the bearing are arranged in this groove and are held in place by two steel cups screwed into a threaded sleeve. When it is desired to remove one of the rear axle halves, all that is necessary to do is to loosen the bolt which clamps the outer ball bearing in place, when the axle with the bearing can be withdrawn from the housing.

The wheels are of the artillery type, with brake drums secured to the metal hubs. The inner radial flange on the hub casting is provided with six arms, to which the spokes are bolted. This arrangement

greatly increases the torsional resistance of the wheel.

Upon the inner end of the sleeve L is mounted loosely the spring block M, in the shape of a T. To the lower end of the block is pivoted a distance rod N, the other end of which is pivoted to the frame of the car. It will thus be seen that there is nothing to prevent the rear axle casing from rotating except the driving shaft sleeve

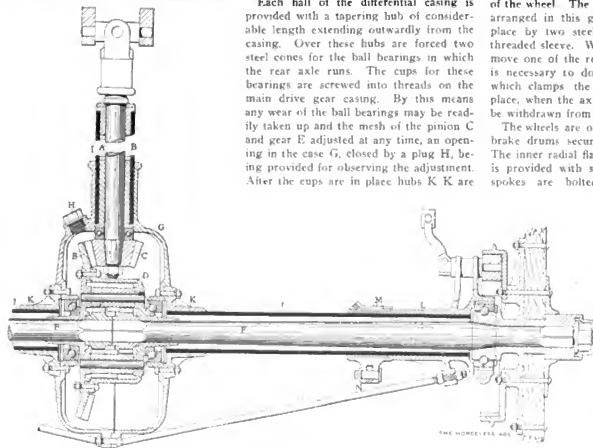


FIG. 2.

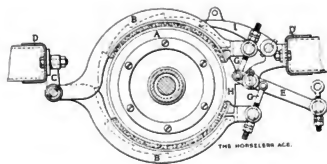


FIG. 4.

and this permits of dispensing with one universal joint. The rear axle casing is supported by truss rods O O.

THE BRAKES.

The rear wheel brakes are of the expanding ring type, and a side view of the brake ring and its support is shown in Fig. 3 herewith. The sleeve on the rear axle tube is cast with a substantial radial bracket A. In a bearing at the outer end of this bracket is journaled a short shaft B carrying on one end a lever arm C and on the other a double cam D. E is the brake ring, which is split in the usual manner and is provided with inwardly extending lugs on both sides of the slit, whereby it is supported on the shaft B and which co-act with the cam D. Contrary to common practice, the ring has no fixed pivot support, and its entire circumference therefore engages with the friction surface of the brake drum. Another point deserving mention is that as the car springs are pivoted on the rear axle sleeves they do not take up any part of the brake reaction, which is entirely taken up by the transmission shaft sleeve (I in Fig. 2).

The transmission brake is of the block type, and is illustrated in Fig. 4. Referring to this figure, A is the brake drum, and B B are the two brake shoes which are pivoted to the bracket C, secured to the channel steel D, forming one of the false frame members. The operating lever E is pivoted to the bracket F, secured to the other false frame member D', and is connected to the free ends of the brake shoes by adjustable links G G. The brake shoes are leather lined. It will be apparent that this form of brake is equally effective for both directions of motion. Formed integral with the brake drum is a ratchet wheel H and pivoted to the bracket F is a pawl I, which when released by the operator engages in the notches of the ratchet wheel and prevents the car from running backward. This arrangement is designed to take the place of the sprag commonly provided.

Fig. 5 shows the steering knuckle of the Clement car, which it will be seen is of the Elliott type. The axle spindle E is separate from the vertical arm of the knuckle, to which it is secured by a threaded joint and with a lock nut and split pin. The centre line of the axle spindle is sufficiently to the rear of the centre line of the

knuckle pin to allow the two parts to pass each other. The vertical arm B of the knuckle is lined with a bearing bushing C. The knuckle pin D is drilled through its centre, and into the top of it is screwed a grease cup. The axle end A is brazed to the tubular front axle. The front wheels run on ball bearings as shown.

The 1904 Sixteen Horse Power Locomobile.

The illustration shows the 1904 16 horse power Locomobile chassis equipped with cellular cooler and fan. The body is made of aluminum and is of the "King of the Belgians" pattern. An unusually roomy tonneau suspended on very long springs and thick, soft upholstery are claimed to insure extremely comfortable and easy riding. The car is further equipped with canopy top, with glass front, side and rear curtains, and also with side hampers and rear hamper. In the view the rear curtain is let down to form a dust shield.

The lamp equipment consists of two brass acetylene headlights, two brass kerosene headlights and a rear red signal light. The car has the well known Locomobile throttle control over the steering wheel, etc. A number of these cars have already been delivered, we are informed.

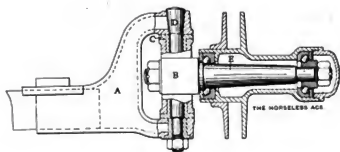


FIG. 5.

The Schug Spark Coils.

The Schug Electric Manufacturing Company, 246 Jefferson avenue, Detroit, Mich., manufacture a line of jump spark coils, with or without vibrators, finished in oak, mahogany or rosewood, when intended for dashboard use. The coils are claimed to be wound with best silk covered wire and to have iridio-platinum points, very hard and large. All the trimmings are nickel plated. The vibrator is of the company's own design, and is said to be easily adjustable and to remain in adjustment. These coils, while ordinarily intended to be operated by battery current, can also be made to work on 10 to 12 volt dynamos.

The Bullock Igniter.

A magnetically operated primary electric igniter is marketed by the Bullock-Beresford Manufacturing Company, Cleveland, Ohio. The device consists of a plug screwed into the wall of the cylinder, somewhat similar in form to any ordinary high tension spark plug, and is used in conjunction with a battery and a contact device on the cam shaft of the engine. One of the plug terminals is grounded and the other is connected through the contact maker to the battery. No coil is required. The



1904 LOCOMOBILE TOURING CAR.

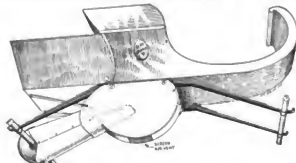


THE BULLOCK IGNITER.

moving part of the igniter is of tool steel, and the contact points are of hard platinum alloy. The current consumption on short circuit is said to be from one-quarter to one-half ampere. The wiring is, of course, very simple, and as no high tension is employed, insulation difficulties are not encountered.

Chain and Gear Protecting Cases—Rain Aprons.

The Automobile Equipment Company, of Detroit, Mich., make a specialty of leather chain boots and engine casings, as



CHAIN BOOT AND ENGINE CASE.

shown in the cut herewith, where these articles are shown applied to an Oldsmobile. The chain boot is claimed to prevent all grit, mud, sand and stones from reaching the chain and sprockets, thus saving wear, and besides to prevent the rattle and noise of the chain. The engine case, it is claimed, is easily put on or taken off, and prevents cutting of the worm and transmission gears.

The rain apron is made from best silk rubber, with a waterproof collar, hand sewed, and is an absolute protection from rain. Many owners use these rain aprons instead of a top in rainy weather. They are made for front and back seats sepa-



TOURING CAR RAIN APRON.

ately, so that when the tonneau is off the front apron can be used alone.

Baltimore Races.

A series of automobile and motor cycle races took place at Electric Park, Baltimore, on Monday, September 7, under the management of Howard A. French. The attendance was estimated at 3,000. The track was a trifle soft, which somewhat reduced the times made. Following is a summary of the results:

Two Mile Race (for gasoline carriages under 1,200 pounds)—J. Henry Miller (Duryea), first; Thomas Goodwin (Fordmobile), second; Charles Vinson (Oldsmobile), third. Time, 4:21.

Two Mile Motorcycle Handicap—Bob French, scratch (Indian), first; James Wooden (Indian), second; Chic Thomas (Indian), third. Time, 4:00 2-5.

Two Mile (steam)—First heat, B. J. Hall (Stanley), first; Orrie Gooden (Stanley), second. Time, 5:02 2-5. Second heat—Thomas Goodwin (Locomobile), first; Albert Kershaw (Locomobile), second; Jack White (Locomobile), third. Time, 4:45. Third heat—Howard Gill (Stanley), first; B. H. Biddle (Stanley), second. Time, 4:36 2-5.

Special Match Race—Bob French (Indian) vs. Robert Atkinson (Aster). Won by Bob French. Distance, 1½ miles. Time, 2:40.

Five Mile Free for All—Howard Gill (Orient buckboard), first; Orrie Gooden (Stanley), second; J. Henry Miller (Duryea), third. Time, 10:13 2-5.

Liquid Air.

In Berlin liquid air is now being delivered to customers at the rate of 2 litres, roughly half a gallon, for about 35 cents. The receptacles are made of glass with double walls, the intermediate space between the walls being filled with non-conducting material, and the external surface silvered to prevent radiation. One of the most fortunate circumstances which the researches of Dewar and others have brought out is that glass will endure such remarkable differences of temperature between the liquid air within and the common air without, amounting to several hundreds of degrees, yet suffer so little from brittleness. It is stated that at 30 cents per gallon considerable practical use might be found for liquid air in minor industries. The availability of liquid air for automobile propulsion is as far removed as ever.

The Detroit Races.

The results of the first day's races on the Grosse Point track, Detroit, were given in our last issue. On the second day, Wednesday, the 9th, the weather was much better than the previous day. The track also was in better condition, though still very heavy next to the pole. The attendance was not as large as the first day, hardly 4,000 people being on the grounds at the start.

The first event of the day was a 3 mile race for cars of 800 pounds and under. Of three entries, two started—F. Prong, Oldsmobile, and B. J. Rutenik, Orient buckboard. The Oldsmobile won by one-half mile in 4:45.

The second race was a 5 mile open. Of eleven entries the following started: Henri Paige, Deauville; Jules Sincholle, Darraq; D. Wurgis, Oldsmobile; Harry Cunningham, Packard; A. J. Scaife, White; Barney Oldfield, Winton. Sincholle immediately took the lead and held it to the finish. Paige followed closely and was never passed. Oldfield soon passed quite a number and took third place, but could not catch up with Paige. Later on he had trouble with the motor (according to another account, a hot axle bearing), and quit in the fourth mile. In the third mile, while near the upper end of the track, between the three-quarter pole and the curve to the stretch, Cunningham's inside rear wheel collapsed. He noticed the trouble early and slackened his pace. The rear end of the machine was thrown into the fence, but the car responded to the sharp turn of the steering wheel to the right, and was guided safely to the gate without further injury to the machine or to the driver. Had there been any other contestants closely following Cunningham, the story might have been different. A new set of wheels was immediately put on and Cunningham won several of the races later in the afternoon.

There was a close contest for third place after Cunningham and Oldfield left the race, and Scaife beat Wurgis by a narrow margin. Time of winner, Sincholle, 5:24.

The third event of the afternoon was the second heat of the special match race between Tom Cooper and Barney Oldfield—5 miles, flying start. Both got an even start, and Cooper took the lead at the turn, holding it for one and a quarter miles, when he was passed by Oldfield. The latter held the lead till the fourth mile, when Cooper swept by in the stretch at a furious rate, running away from Oldfield and finishing first, in 5:18 3-5. The fastest mile was made in 1:02 1-5. Oldfield stopped in the stretch, claiming to have trouble with the motor. He drove gamely and was to all appearances fairly beaten.

The next event was a special triangular match race of 10 miles, between three Paris-Madrid racers, with their original drivers, flying start. All three started. Sincholle took the lead early in the race and held it. Paige showed good speed, and was only one-sixteenth of a mile behind at

the finish. Papillon's machine was not in good form, the driving gear having broken the day before and the repaired part did not work right. He finished a mile behind. Time of winner, to:24. The fastest mile was made in 1:02 3-5.

After the Frenchmen were off the track Frank Day made an attempt at the 5 mile record in the Tom Cooper racer (not the "999" formerly driven by Oldfield), but failed. Time, 5:17 4-5. Fastest mile, 1:02 2-5. The record is 4:54, and was made by Oldfield with the "999" at the Empire City track, Yonkers.

Next came the deciding heat of the Oldfield-Cooper match. Cooper started poorly, but passed Oldfield in the first mile, only to be overtaken and passed in the second. Oldfield won by about 30 yards, in 5:15 2-5. A good deal of dissatisfaction was expressed at the grand stand on account of the irregular start. The starter tried to recall the drivers, but neither understood the signal, and when they had finished one mile they were signalled to keep on. Cooper raised no objection, and the decision stood.

The next event was a 10 mile handicap (three minute limit), open to cars of 1,800 pounds and under. There were ten entries, but only seven starters, as follows: F. Prong, Oldsmobile, 3m. handicap; D. Wurgis, Oldsmobile, 1m. 20s. handicap; G. Papillon, Darracq, 1m.; Henri Paige, Deauville, 1m.; Jules Sincholle, Darracq, 30s.; Harry Cunningham, Packard, 30s.; Barney Oldfield, Winton, scratch. Cunningham had replaced his large wheels with smaller ones. Oldfield stopped his motor at the start, and was out of the race; Sincholle had trouble with his motor, and quit early, and Papillon quit in the ninth mile for the same reason. A tire on Paige's machine exploded, but he kept up for a mile with the deflated tire, when it came off, resulting in the collapsing of the front wheel, breaking the front axle and throwing the machine into the fence. Paige was badly scratched and bruised, but not seriously hurt. This left but three contestants in the race, which finished in the following order: Cunningham, Wurgis, Prong. Time of winner, to:53 4-5.

The next event was a 10 mile open race, in which but two of the ten entries started: Cunningham and Oldfield. Sincholle lined up for the start, but became alarmed at the condition of his tires and withdrew. Oldfield had trouble with his motor, and stopped at the first turn. Cunningham had gone 2 miles when Oldfield joined him again, after getting started. It was plain that Oldfield could never make up the two laps; but he drove furiously, and gained rapidly on Cunningham. At the turn into the stretch in the seventh mile Oldfield's right-hand front tire exploded, the machine became unmanageable, dashed through the outer fence, down the bank, smashed several rods of light fence, and then crashed into a tree, reducing itself to a mass of junk. Oldfield was thrown



START OF THE RACE FOR CLUB MEMBERS.

from the machine when it plunged down the bank, and landed about 10 feet from where the machine stopped. He climbed up the bank and walked on the track toward the grand stand, from where an automobile was sent in which he was carried to the city. At the hotel he underwent a doctor's examination, which revealed a broken rib and several severe cuts on the back. His escape is a miracle. Several men stood along the fence, and when the big machine plunged toward them all but one got out of the way—J. Frank Sherar, of Barberton, Ohio, who was struck squarely in the back and hurled fully 60 feet to the roadway below. He was badly mangled, and died on the way to the hospital. His brother was with him, and escaped a similar fate by a hair's breadth. The shock made him speechless, and a doctor's examination was required before it could be told whether he had been seriously injured or not.

Cunningham continued the race and finished in 10:58 3-5. This concluded the events of the day.

Following is a list of the officials of the meet: Referee, A. R. Pardington, New York city. Judges, George Collier, Cleveland; Edwin E. McMasters, Detroit; Steve Hartnell, Detroit; E. E. Kirk, Toledo; Russell A. Alger, Jr., Detroit. Timers, Robert H. Slusser, New York; R. B. Clark, Detroit; D. J. Campbell, Detroit; W. G. Moxley, Detroit; Tom Deekert, Cleveland. Starter, A. J. Picard, New York city, member of A. A. A. Clerks of course, George D. Grant, Detroit; Fred Lutz, Detroit, and Harry Miller, Detroit.

The fatality and the other accidents cast a gloom over the whole meet. It had

been announced by William E. Metzger during the afternoon that arrangements had been perfected for a second meeting in Detroit between Oldfield and Cooper September 26. The Frenchman had promised to be on hand again and enough entries had already been guaranteed to make the affair a success from the standpoint of competition. The events were practically canceled, however, consequent upon the fatal accident.

The Syracuse Races.

A series of automobile races, under the auspices of the Syracuse Automobile Club, were held at the State Fair track, Syracuse, on Saturday, September 12. The day previous there was an automobile parade through the city in which about fifty machines participated. The parade started at the new library building at 8:15 p. m. and passed through Montgomery street and East Genesee street over to the north side, returning by way of North Salina street, West Genesee street, James street, South Salina and Onondaga street, back to the Yates Hotel, where it disbanded.

The weather on Saturday was fine, and the meet was well attended, the grand stand and the enclosure holding some 7,000 persons. Owing to the accident to Barney Oldfield at Detroit the full program could not be carried out, and the event therefore lost quite a little of its interest to the spectators.

The first event of the afternoon was a 2 mile race for motor bicycles, stock machines, for a \$60 silver cup. It was won by A. S. Noonan, Rome; W. F. Murphy, New York, secured second place, and James P. Woodruff, Syracuse, third.

The next event was a 5 mile open race



MATCH RACE BETWEEN COOPER AND OLDFIELD.



THE OLDSMOBILE "PIRATE."

for cars under 1,200 pounds for a \$100 silver cup. It was won by Dan Wurgis with the Oldsmobile Pirate in 5:40, a new world's record for this class. The former record (6:54) was held by John Wilkinson, and was established by him at the Empire City track in July. Second place was secured by John Wilkinson, Franklin; time, 5:59.

The next event was a 5 mile race for Winton touring cars with tonneau attached, for a \$75 silver cup. H. H. Mundy, Utica, led for the first 3 miles, when something went wrong with his motor and his pace became slackened. The race was won by Albert E. Petrie in George S. Larrabee's car. Time, 9:55.

The event of the day was the special match race between Jules Sincholle and F. A. La Roche, both in 40 horse power Darracq cars. It was to have been a triangular match race, with Henri Paige, Decauville, as the third competitor, but his machine had met with an accident at Detroit, which prevented him from starting. The race was run in 5 mile heats, with flying start, best two in three. At the start of the first heat La Roche took the lead, but Sincholle had caught up and passed him before the end of the first mile and gained steadily from then on, winning in 5:15 2-5. In the second heat something went wrong with Sincholle's

motor and he quit at the end of the fourth mile, La Roche winning in 5:48 4-5. In the third heat Sincholle was an easy winner in 5:14 1-5, thereby securing the cup.

The next race was a 10 mile open for cars under 1,800 pounds, for a \$125 silver cup. There were four starters: Jules Sincholle, Darracq; F. A. La Roche, Darracq; Dan Wurgis, Oldsmobile, and John Wilkinson, Franklin. Sincholle was an easy winner, making a time of 10:36 2-5; La Roche, second; Dan Wurgis, third.

Next a 5 mile handicap for members of the Automobile Club of Syracuse was run off, the prize being a \$75 gold cup. The starters were as follows: John Wilkinson, Franklin; R. M. Cornwall, Franklin; A. E. Petrie, Winton; C. A. Benjamin, Franklin; W. H. Bex, Franklin; Oscar N. Hine, Franklin; H. W. Chapin, Franklin, and Forman Wilkinson, Franklin. The event was won by John Wilkinson, who started scratch, in 8:23 1-5. R. M. Cornwall, five-sixteenth mile handicap, was second, and A. E. Petrie, one-quarter mile handicap, third.

Event No. 7 was a 5 mile race reserved for Franklin cars of regular stock model, \$125 silver cup prize, presented by the H. H. Franklin Manufacturing Company. It was won by R. M. Cornwall in 9:2 4-5, Oscar N. Hine was second and Forman Wilkinson third. There were six starters,

all from Syracuse, and the winner finished over a mile ahead of the last to finish.

The last event of the day was 1 mile record trials, for \$125 silver cup. It was won by F. A. La Roche, Darracq, who made a time of 1:14 3-5. A prize for the fastest mile, made by cars under 1,200 pounds, was secured by Dan Wurgis, Oldsmobile; time, 1:08. John Wilkinson, Franklin, finished second in 1:11.

The officials of the meeting were as follows: Referee, A. R. Pardington, Brooklyn. Judges, William Horace Hotchkiss, president Buffalo A. C.; Lee Richmond, president Rochester A. C.; Charles M. Page, secretary Albany A. C.; Harry H. Mundy, secretary and treasurer A. C. of Utica, and George S. Larrabee, second vice president A. C. of Syracuse. Timers, H. W. Smith, president New York State Association of Automobile Clubs, first vice president Automobile Club of Syracuse; Alexander T. Brown, Syracuse; Charles S. Averill, Syracuse; William B. Burns Syracuse, and John A. King, Syracuse Starter, A. J. Picard, New York; assistant starter, T. A. Young, Syracuse. Clerk of course, F. J. Wagner, Buffalo; assistant clerk of course, W. A. Fancher. Announcer, Peter Prunty, New York.

Club Notes.

TOLEDO A. C.

The Toledo Automobile Club, of Toledo, Ohio, held a basket picnic at Ottawa Park on September 5.

GRAND RAPIDS A. C.

The Grand Rapids Automobile Club, of Grand Rapids, Mich., sent twenty-five members to the reception given them by the Chicago Automobile Club on September 4. The run was made in a driving rain.

BUFFALO A. C.

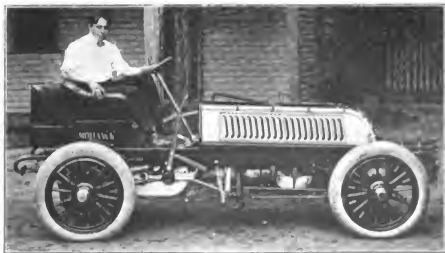
A meeting of the board of governors of the Buffalo Automobile Club, of Buffalo, N. Y., was held on September 4. An invitation to visit, from the Toronto Automobile Club, was read, and the details for the club run to Niagara Falls on September 19 were approved.

MACON A. A.

An automobile club—the Macon Automobile Association—was organized in Macon, Ga., on September 2. Dr. A. S. Moore was elected president. Dr. H. H. Johnson vice president, E. W. Burke secretary, and Frank B. West treasurer. Twenty-four members were enrolled, a number of committees appointed, and the first club run organized.

A. C. OF KANSAS CITY.

At its meeting on September 4 the Automobile Club of Kansas City, of Kansas City, Mo., discussed arrangements for its race meet to be held October 8. Fifteen entries have already been received. The question of whether the new State law requires payment of a county tax in every county through which a machine may be toured was also considered. A club pin was adopted.



EARL KISER'S "MOHAWK" RACER, WITH FOUR CYLINDER (7x7) 100 HORSE POWER ENGINE.

Route of Endurance Contest— Changes in Rules.

The weighing of cars for the Endurance Contest will take place on Monday, October 5, at the establishment of the New York Transportation Company, Forty-ninth street and Eighth avenue, and the run will start at 7 a. m. on Tuesday, October 6, instead of Wednesday, October 7, as originally planned. The journey from Cleveland to Pittsburg will be made in two days instead of one, the hills being so precipitous that they would be a too severe strain upon the operators were the trip attempted in one day.

The headquarters each evening will be as follows: October 6, Pine Hill Hotel, Pine Hill; October 7, Bennett House, Binghamton; October 8, Nichols House, Bath; October 9, Iroquois Hotel, Buffalo; October 10, and Sunday, October 11, Reed House, Erie; October 12, Hollenden Hotel, Cleveland; October 13, Tod House, Youngstown, Ohio; October 14, Hotel Schenley, Pittsburg.

It has been impossible to obtain covered garages for the number of machines expected, except at Cleveland, where the Central Armory has been secured. It will be necessary therefore for operators to be supplied with waterproof covers for their machines.

Entries for the run close on Monday, September 22, at 4 p. m., and positively no entry will be accepted after that hour.

It has been ascertained that 1,500 arrows will be needed to mark the course. The mayors of towns and presidents of villages along the route have been given notice of the time at which the machines may be expected to pass through, and have been asked to give notice to the people so that spirited horses may be kept off the road, and accidents prevented.

It will be necessary for each car to be supplied with New York, New Jersey and Pennsylvania licenses. Blank application forms may be obtained at the office of the N. A. M.

Following is the itinerary of the contest:

TUESDAY, OCTOBER 6.

The start will take place at Hewachken, near the Point View Hotel.

Woodcliffe, 1½ miles; Little Ferry, 6½; Hackensack, 8½; Ridgewood, 16½; Hoboken, 18½; Waldwick, 19½; Allendale, 21; Mahwah, 25½; Suffern, 27½; Ramapo, 29; Sloansburg, 30½; Tuxedo, 33½; Southfields, 37½; Central Valley, 44½; Highland Mills, 45½; Woodbury Station, 47; Mountville, 50½; Orrs Mills, 53; Vail Gate, 54½; West Newburgh, 57½; Newburgh, 58½; Cedar Hill Cemetery, 64½; Marlboro, 62½; Milton, 71½; Highland, 75½; Ulster Park, 86½; St. Remy, 90½; New Salem, 91½; Eddyville, 91½; Wilbur, 92½; Kingston, 94½; Stony Hollow, 100½; West Hurley, 102; Olive Branch, 104½; Shokan, 108½; Beechford, 130½; The Corners, 114½; Phoenicia, 118½; All-

ban, 123½; Shandaken, 124½, and Pine Hill, 130½.

WEDNESDAY, OCTOBER 7.

Griffins Corners, 133½ miles; Fleischmanns, 134; Margaretville, 140½; Duntaven P. O., 144½; Andes, 152; Delhi, 165½; Treadwell P. O., 175½; Franklin, 183½; East Sidney P. O., 187½; Nadia, 192½; Bainbridge, 202½; Afton, 208½; Nineveh, 214½; Harpersville Village, 215½; Belden, 219½; Sanitaria Springs, 225½; Port Grain, 228½; Port Dickinson, 233½, and Binghamton, 236½.

THURSDAY, OCTOBER 8.

Union, 245½ miles; Campville, 252½; Hiawatha, 255½; Oswego, 259½; Lounsberry, 265½; Nichols, 268½; Smithboro Bridge, 270½; Barton, 273½; Ellestown, 278½; East Waverly, 279½; Waverly, 281½; Chemung P. O., 283½; Chemung Station, 286½; Wellsburg, 292½; Elmira, 298½; West Junction, 303½; Horseheads Station, 305½; Big Flats, 310½; East Corning Station, 313½; Gibson, 316½; Corning, 319½; Painted Post, 321½; Coopers, 324; Campbell, 328½; Savona, 333½, and Bath, 339½.

FRIDAY, OCTOBER 9.

Kanona, 343½ miles; Avoca, 348½; Wallace, 351½; Cohocton, 356; Patchins Mills, 363½; Perkinsville, 365½; Dansville, 367½; Kysorville, 378½; Sonyea Craig Colony, 381½; Mt. Morris, 385½; Jenico, 392½; Avon, 401½; Caledonia, 408½; Le Roy, 415½; Batavia, 425½; Corfu, 437½; Crittenden, 442; Mill Grove, 445; Bowmansville, 451½, and Buffalo, 462½.

SATURDAY, OCTOBER 10.

Woodlawn Beach, 472½ miles; Wana-kah, 477½; Idlewood, 481½; Evans Centre, 487; Farnham, 492½; Irving Station, 494½; Irving, 494½; Silver Creek, 498; Sheridan Centre, 504; Fredonia, 510; Brocton, 516½; Portland, 519½; Westfield, 526½; Forsythe, 531; Ripley, 534½; State Line, 537½; Northeast, 542½; Mooreheads, 546½; Harbor Creek, 549½; Wesleyville, 553½, and Erie, 555½.

SUNDAY, OCTOBER 12.

Miles Grove, 574½ miles; East Springfield, 579½; West Springfield, 583½; East Conneaut, 587½; Conneaut, 588½; North Kingsville, 596; Ashtabula, 602; Geneva, 611½; Madison, 618½; Painesville, 639½; Mentor, 635½; Willowby, 640½; Euclid, 649, and Cleveland, 663.

TUESDAY, OCTOBER 13.

Chagrin Falls, 682½ miles; Auburn Centre, 690½; Auburn Corners, 692½; Troy, 694½; Parkman, 700½; Southampton, 709½; Warren, 716½; Girard, 726; Briar Hill, 729½, and Youngstown, 731½.

WEDNESDAY, OCTOBER 14.

Pöland, 736½ miles; Small Middleton, 751½; Peterburg, 746; Enon, 747½; Darlington, 751½; Beaver Falls, 758½; New Brighton, 760½; Freedom, 765; Conway, 765½; Baden, 768½; Economy, 771½; Leesdale, 773½; Sewickley, 775½; Greenfield, 779½; Emsworth, 784½; Avalon, 783½; Woods Run, 786½; Allegheny, 786½, and Hotel Schenley, 793.

...OUR... FOREIGN EXCHANGES.



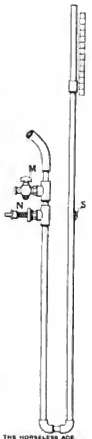
Apparatus for Testing the Air-tightness of Pneumatic Tires.

All pneumatic tires allow the air contained within them to leak out through their walls—some slower, some faster. New tires, especially the larger sizes, sometimes do not require pumping for months, but the walls of the tires often become porous with age and the tires must then be pumped up quite frequently, which is very bothersome, to say the least. The automobilist at present has no other means

of determining the degree of leakiness (or air tightness) than the frequency with which re-pumping is required. Many would undoubtedly welcome a simple apparatus admitting of determining accurately the rate at which the air leaks out of the tire or at which the pressure in the tire drops. Such an apparatus is described by Georg Rothgesser in a recent issue of the *Automobil Welt*, and is constructed as follows:

A gas pipe 15 feet long has connected to it at one end a glass tube 40 inches long. The joint must be made water tight, but there is no particular difficulty in making it so if an ordinary gas pipe coupling is used. To the other end of the gas pipe is screwed an elbow into this a short gas pipe 4 to 8 inches long, at the end of this pipe another elbow, and into this a gas pipe to feet long. The two long gas pipes are arranged parallel to each other and vertically, and in case a sufficiently high room is not available the pipes are let through the floor into the cellar or basement. When the apparatus has once been fastened to a wall, the same as ordinary gas pipes, it is always convenient, does not take up any extra room, and admits of a very accurate determination of the air tightness of the tires.

At a height of 9 feet 4 inches above the short horizontal pipe a small hole is drilled into the wall of the longer of the gas pipes, which is tapped out and closed by means of a machine screw and leather washer. The object of this small opening is to permit of filling the two vertical pipes with water to an exact height. The screw is taken out and water is poured into one of the two pipes, by means of a funnel, un-



THE HORSELESS AGE.

til it runs out of the hole in the wall of the longer pipe. The hole is then closed by putting the screw in place. A graduated scale is now fastened alongside the glass tube, the zero mark of the scale being placed at exactly 8 feet 3 inches above the screw S.

To the upper end of the shorter pipe are connected two branch pipes M and N, the former containing a valve cock and the latter an ordinary tire valve, to which a tire pump may be attached. The upper end of the shorter pipe is now connected by means of a hose to the tire to be tested.

Air is now pumped into the upper end of the shorter gas pipe and the tire connected therewith through the valve N, and the rise in air pressure resulting therefrom will cause the water level to sink in the shorter pipe and rise in the longer one. The pumping is continued until the water level in the longer pipe is even with the zero mark of the scale and if by accident a little too much pressure should be pumped up, a little air can be allowed to escape by momentarily opening the cock M. The pressure within the tire is now one-half atmosphere or 7.35 pounds per square inch (supporting a water column of 16.5 feet), which is sufficient for the purposes of the test.

The test itself is extremely simple. After the water level has been adjusted to the zero mark the time is noted. After exactly sixty minutes the apparatus is examined again, and it will then be found that the water level in the glass tube has fallen. If the scale is graduated in millimetres, the number of millimetres that the level has dropped in one hour may be regarded as the degree of leakiness of the tire, and thus a direct and simple means of comparison be had.

A New Renault Cooler.

One of the distinctive features of the well known Renault cars is the cooling

system, which consists of rows of nearly vertical radiating tubes on both sides of the motor, connected to headers on top and below, through which the water circulates by gravity. The arrangement is extremely simple and quite efficient as far as the cooling is concerned, but presents the disadvantage that it renders the motors more or less inaccessible. This defect seems to have been recognized by the manufacturers, for they have recently designed and patented in France a new arrangement which does away with this difficulty. The sketch herewith illustrates this arrangement.

The combined tank and radiator is located behind the motor and just in front of the dash. It consists of an upper and a lower tank which are in communication with each other through a larger number of flat tubes having a very elongated rectangular section. These tubes are spaced very closely, only about one-sixteenth of an inch apart. The jackets of the cylinders are in direct communication with the upper and lower tanks of the radiator, as indicated, and the circulation is by gravity or thermo-siphon action.

The motor is covered with a bonnet having double walls, the two walls being at an appreciable distance from each other, thus forming an air space between them. Openings are pressed into the metal sheet forming the outer wall to allow the air to freely pass into the space between walls (air jacket). The air jacket communicates at the rear with a space A between the dashboard and the vertical radiator tubes. At the opposite side of the tubes there is a similar space B, formed by the tubes and a sheet metal wall C. The space B communicates with a case surrounding the flywheel by a large flat tube D. The arms of the flywheel are developed fan blade fashion, and when the motor is running the fan action draws the air into the air jacket of the bonnet through the openings

through chamber B and tube D out through the flywheel. When the car is in motion the circulation of air through the radiator is, of course, increased.

It is to be remarked that a cooler of the cellular type would be quite unsuitable for thermo-siphon circulation, owing to the great resistance to the flow of the water that would be offered by the very small water spaces and the more or less broken paths. In this cooler the cross section of the circulation system is large at every point and the tubes are vertical, and offer therefore a minimum of resistance.

The Russian Minister of the Interior has fixed the limit for automobile and motor cycle taxes at 3 rubles per horse power.

The prefect of the Department of the Hérault, France, has refused his sanction of the "Circuit de l'Hérault" race.

The Automobile Club of Great Britain and Ireland has issued a volume containing its rules and list of members for 1903.

The German Automobile Manufacturers' Association, in conjunction with the Frankfort Automobile Club, will hold an automobile exhibition at Frankfort-on-Main March 19 to 27, 1904. The Agricultural Hall, which has already repeatedly served for similar purposes, has been rented.

Automobiles will play an important part for the first time in the Italian army manoeuvres next fall. The generals, division chiefs and staff officers will all be provided with automobiles, to carry them from point to point, as may be required by considerations of tactics and military strategy.

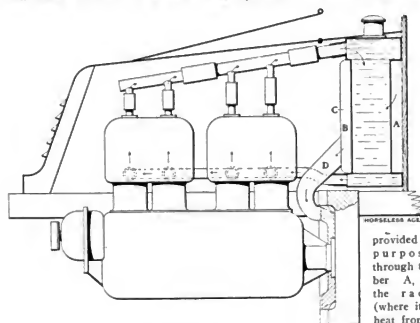
The Russian Minister of Finance has given permission to alcohol distillers for the period of three years, to use their spirit, after having made it chemically un-

fit for drinking, tax free, for such purposes as driving motors. The British Consul General at Warsaw thinks that this will create a big opening in Russia for alcohol motors, but, he naively adds, "the difficulty is to find means of spoiling the taste of the alcohol to such an extent that the Russian peasant will not drink it."

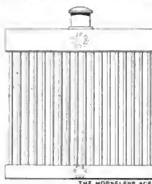
New Incorporations.

The Marble-Swift Automobile Company. Phoenix, Ariz. Capital, \$1,000,000—in Illinois, \$2,500.

Articles of association were filed at Lansing, Mich., on September 4, by the Packard Motor Car Company, of Detroit, Mich., and Warren, Ohio. Capital stock, \$400,000.



THE RENAULT COOLER.



THE HORSELESS AGE

provided for that purpose, then through the chamber A, through the radiators (where it abstracts heat from the radiator tubes),

TOURING IN

AMERICA.

XI—Eastern Massachusetts.

By C. H. GILLETTE.

Eastern Massachusetts cannot afford the touring automobilist mountain scenery, but it has many points of historic interest. From the time our Pilgrim Fathers landed at Plymouth Rock, Massachusetts made history very fast. One of the characteristics of New England, and especially Massachusetts, like that of old England, is the preservation of the old historical land-

and cities insures great ease and comfort in touring. There are also for the tourist personally many old fashioned inns on these routes, a stop at any of which is a delight to the lover of that peculiar glamour which goes with high straight backed chairs, antique furniture and the luxurious roominess of the buildings of one hundred years ago.

One very excellent tour runs out of Boston through Charlestown to Portland. This road is a good one all the way. Starting at the Capitol, at Beacon street, and running into Tremont street through Scollay square into Hanover street, and then into Washington street, to Charlestown Bridge over the Charles River, one passes by Bunker Hill and skirts the Navy Yard

of John Wood, the leader. Fortunately, the Indians were friendly and the town prospered.

After crossing the railroad and turning slightly to the left through Swampscott, follow the trolley line direct to Salem. At Swampscott is a splendid big hotel, the New Ocean House, now entering upon its second year. It is one of the largest summer resorts in New England. Along this road between Lynn and Salem is an old bridge that has somewhat of the glint of romance about it. It was built about 100 years ago, when the turnpike was first opened. The original structure still remains, and the only repairs that have been made have been done by placing planking on the top, so that the bases of the struc-



THE OLD "FLOATING BRIDGE."

marks. It is that spirit of conservatism which has kept these mementos of the days when our fathers made the history of the colonies, and finally transformed these same colonies into a nation.

While a thoroughly modern commercial centre, Boston itself is replete with the atmosphere of old-time yesterdays. We cannot look upon Boston Harbor without thinking of the world famous "Tea Party." We cannot cross Charles River from Boston proper into Charlestown without coming upon Bunker Hill, and its monument, sacred to the memory of the immortal battle.

For automobile touring in Eastern Massachusetts, Boston is the natural centre about which radiate scores of beautiful tours, long and short, and in all directions. In this territory the large number of towns

along Chelsea street to Mystic River, crossing to Chelsea. Here Broadway is followed through Revere to Lynn and Swampscott, on the shore road.

Lynn and Swampscott are twin cities. It was not until the year 1852 that Swampscott became incorporated as a town separate from Lynn. From State records we find that Lynn was established in 1637, but we have other sources of information, not to be refuted, which state that the first settlement was made in 1629 and was called Saugus.

There were five families of those which came over with Endicott from England in 1629 and settled in Salem, which separated from their comrades and chose the spot which is now Lynn. They selected that part which is now called Woodend, and which seems to have been named in honor

ture are several feet under the water. It is known as the "Floating Bridge."

Salem is the capital of Essex County, Mass. It is situated on a peninsula, beyond which juts Marblehead. During the latter part of the eighteenth century and the beginning of the nineteenth century it was the centre of all foreign commerce on the New England coast, especially with the East Indies. Salem has lost its prestige in this regard, owing to natural disadvantages. The shallow harbor drove foreign commerce to Boston at the advent of heavy draught vessels.

The present industries of Salem are cotton mills, jute mills, tanneries, etc. The main features of interest in Salem are its historical and literary associations. Nobody goes to Salem without visiting the Peabody Academy, founded by Peabody,

the philanthropist. The academy bought the East India Marine Hall, built in 1824, which institution was made up of captains and supercargoes who had traveled around Capes Horn or Good Hope. It was a kind of an honorary institution. The building contains now, under the trusteeship of the academy, the splendid collections of the old East India Museum and the Essex Institute, illustrating the zoology, archaeology and natural history, etc., of Essex County. Peabody Academy is not to be confounded with the Peabody Institute, which latter is situated in the town of Peabody (South Danvers), 2 miles away.

Another old landmark of Salem is the custom house. No one ever visits the custom house without having called to mind the clerkship there of Nathaniel Hawthorne, America's greatest novelist. There was written Hawthorne's famous novel, "The Scarlet Letter," the introduction of which is a masterly description of the old custom house as it was at the time of his writing. Hawthorne was born in Salem, at No. 21 Union street.

Many other men of national fame came from this city. Timothy Pickering, who was Secretary of State from 1795 to 1800; Gen. Israel Putnam, of Revolutionary fame; F. T. Ward, of China celebrity; John Rogers, the sculptor; Bowditch, the astronomer and mathematician; Maria S. Cummins, the novelist; W. H. Prescott, the great historian, and many others of lesser fame.

Naumkeag was the Indian name for the place where Salem is situated, and means Eel Land. The first house in Salem was

built by Roger Connants in 1626. In 1628 the first settlement was made by John Endicott and a number of followers under the name of Salem. John Winthrop, governor of the colony, brought a large body of colonists from England in 1630, which considerably swelled the small population of the town. In 1692 the sad story of the persecution of the Quakers darkens the fair page of Salem's history. Then came another equally cruel persecution, led by Cotton Mather. There were nineteen so called witches hanged on Gallows Hill, and one Giles Cory was "pressed" to death. The city charter of Salem was granted in 1836.

From here to Beverly is a poor road, but fortunately the distance is only 2 miles. This is the only stretch of road along this entire route that is not first class in every respect. At Beverly the road leaves the shore line, nearing it again at Ipswich, 10 miles beyond. Here also a side route, very interesting in many ways, can be taken, following the railroad tracks practically all the way to Gloucester, a distance of about 12 to 15 miles. It is a fairly good road and nearly level all the way.

Gloucester is one of the principal cities and the port of entry of Essex County. It is second only to Boston in foreign trade, but its principal industry is fishing. More than 400 vessels put out of Gloucester every year and return with an average, year in and year out, of 10,000,000 pounds of fish. Five thousand men are in this employ, the ranks of which, though yearly depleted by wrecks, are, nevertheless, always refilled from the city's seafaring population.

Gloucester has a splendid harbor, and

will admit vessels of almost any draught. It was first occupied as a fishing station in 1624, and was the first settlement on the north shore of Massachusetts Bay. It is an attractive and a favorite summer residence section.

About 2 miles from Gloucester is Norman's Woe, the scene of the "Wreck of the Hesperus," which Longfellow immortalizes in his poem of that name. The settlers of Gloucester came mostly from Gloucester, England, from which the new city derives its name.

The main route to Portland passes around the end of Wenham Lake at Newham and through Hamilton to Ipswich. From here on the entire route keeps pretty well to the shore line. About 10 miles beyond Ipswich it goes through Newburyport, passing Plum Island just off the shore. After crossing the Merrimack River at Newburyport, the road follows the river to Salisbury and turns northward again through Hampton to the shore line, which it follows very closely for 3 or 4 miles to Straw Point. Then again it leaves the shore line, going through Rye to Portsmouth.

Crossing the bridge at Portsmouth, the highway turns due east for a short distance, nearing the shore again, which it follows through the famous summer resorts of York Beach, Cape Neddick, Ogunquit, etc. It leaves the shore a little beyond, and goes through Biddeford to Portland.

Another route from Boston, not so good as this one to Portland, but equally interesting, is to Concord, N. H. It is a run of about 80 miles, mostly along the



No. 21 UNION STREET, WHERE HAWTHORNE WAS BORN.



THE OLD MANSE WHERE HAWTHORNE WROTE.

Merrimack River road. There are no hills along this route, but the road can be called only fair. Facilities along this route are very good, however, nearly every town having an automobile station which can do at least light repairs.

This route runs out of Boston by way of Beacon street, Massachusetts avenue and Harvard Bridge to Harvard square in Cambridge.

The most notable landmark in the city of Cambridge is Harvard University. Cambridge is also the birthplace of James Russell Lowell, America's poet-diplomat. From Cambridge on to Lowell the road follows the trolley tracks practically all the way, going through Arlington and Lexington to Billerica. Until Lexington is reached the road is very level; but going through Billerica to Lowell one strikes a rolling road, which, however, has no heavy grades.

Lexington is one of the towns whose fame will never diminish as long as American history is taught. On this ground in Lexington is the famous monument in commemoration of the deeds of the little band of the fifty minute men.

At Concord there is a granite obelisk, 25 feet high, erected in 1835, commemorating the spot where the first English soldiers fell under the fire of Colonel Barrett. Here also is the Old Manse in which Hawthorne lived when he wrote "Mosses from an Old Manse," besides much other literary work. The house in which Hawthorne was born and "the Old Manse" are shown herewith.

(To be continued.)

Outside Companies.

The following list is of interest as showing what a large number of automobile manufacturers are still "outside" of the A. L. A. M.

Of these sixty-two concerns, at least twenty are conducted by experienced automobile men, with ample capital and manufacturing facilities behind them:

Phelps Motor Car Company, Stoneham; H. L. Radford, Boston; Country Club Car Company, Boston; United States Motor Corporation, Pawtucket; Boston-Amesbury Company, Amesbury; United States Automobile Company, Attleboro; H. H. Buffum, Abington; Bouton Motor Company, Portland; Warwick Cycle and Automobile Company, Springfield; Automotor Company, Springfield; Corbin Motor Vehicle Company, New Britain; Moyea Automobile Company, Greenfield; Daimler Manufacturing Company, Astoria; Mohler & De Gress, Long Island City; Howard Automobile Company, Yonkers; Springer Motor Vehicle Company, New York city; Rapid Motor Vehicle Company, New York city; Desberson Automobile Company, New York city; Rockaway Automobile Company, Rockaway; R. C. Wall Manufacturing Company, Philadelphia; Norman Wheel Company, Philadelphia; Acme Motor Car Company, Reading; Duryea Power Company, Reading; Buckmobile Company, Utica; Remington Motor Vehicle Company, Utica; Kensington Automobile Manufacturing Company, Buffalo; O. K. Macchine Company, Buffalo; Morlock Automobile Company, Buffalo; B. V. Covert & Co., Lockport; Schaeffer-Bramley Company, Lock-

port; Holly Motor Company, Bradford; Fredonia Manufacturing Company, Youngstown; Star Automobile Company, Cleveland; F. B. Stearns Company, Cleveland; Otto Konigsow, Cleveland; Cleveland Automobile Company, Cleveland; Atlas Screw and Tack Company, Cleveland; H. L. Hoffman Company, Cleveland; Krastin Automobile Company, Cleveland; Columbus Motor Vehicle Company, Columbus; Sandusky Automobile Company, Sandusky; Ford Automobile Company, Detroit; Marr Automobile Company, Detroit; Ideal Automobile Company, Detroit; Chelsea Manufacturing Company, Chelsea; Church Manufacturing Company, Adrian; Matheson Motor Car Company, Grand Rapids; Michigan Automobile Company, Kalamazoo; Hudson Automobile Manufacturing Company, Hudson; Clarkmobile Company, Lansing; Union Automobile Company, Union City; Auburn Motor Vehicle Company, Auburn; Premier Manufacturing Company, Indianapolis; National Motor Vehicle Company, Indianapolis; Mohawk Cycle Company, Indianapolis; National Sewing Machine Company, Belvidere; Bartholomew Company, Peoria; St. Louis Motor Carriage Company, St. Louis; Fanning Manufacturing Company, Chicago; Chicago Motor Vehicle Company, Chicago; T. B. Jeffrey & Co., Kenosha; Standard Wheel Co., Terre Haute.

The authorities of the kingdom of Saxony, Germany, have decided that hereafter it shall be unlawful for automobilists to use a signalling horn, and the use of a bell will be required instead. There is said to be considerable opposition to this measure both among automobilists and the public.



The H. J. Reading Truck Company, of Detroit, Mich., are testing a heavy electric truck, the first of its kind in Detroit.

Herb Pelton, of Cherokee, Ia., has purchased the stock and business of Treney & Co., and has been appointed Oldsmobile agent for South Dakota and Northwestern Iowa.

The following seven American cars have been entered in the English reliability trials: One Stanley steam runabout, one Cadillac, two Oldsmobiles, two Whites and one Winton.

C. A. Duerr & Co., of 152 West Thirty-eighth street, New York city, have recently taken the agency of the Ford automobile. They report the sale of a number of cars.

It has been decided that the annual fall races of the Chicago Automobile Club shall this year be held on September 28 and 29 instead of on September 25 and 26, as originally planned.

The Commercial Motor Company, of Jersey City, N. J., which absorbed the Pan-American Company, has several kerosene burning steam delivery wagons nearing completion at its works.

Baron de Dietrich, of the European automobile company of that name, is expected in this country within a few weeks. There are rumors of an American factory and salesrooms to be established.

In a letter to the commissioners of Muscogee County, Ga., a prominent farmer threatens to use a shotgun on the next automobilist who races by him, claiming that he prefers a killing to a runaway.

A court order has been secured against the Bray Manufacturing Company, of Newark, N. J., by Landon R. Goodwin, directing the said company to show cause why it should not be declared insolvent.

F. A. Babcock, of Buffalo, N. Y., is having built an electric automobile in which he proposes to run from Boston to New York. The machine is to run 75 miles on a charge, and to develop a maximum speed of 25 miles.

In Chicago, September 9, James L. Osborn filed a \$5,000 damage suit against Chas. E. Haggman, Chas. Hammerly and Richard L. Rusk on account of injuries sustained in an automobile accident during October, 1901.

M. J. Patterson, No. 506 Colorado Building, Denver, Col., offers \$300 reward for information leading to the return of his Franklin car, which was stolen in front of the Boston Building, Denver, between 8 and 10 p. m. Tuesday, September 8, and for the conviction of the thief. He states in a circular that the manufacturer's num-

ber on the name plate is 106, and that there are only three machines of the kind in Colorado.

The show at Detroit next year will be held February 15 to 20, directly after the Chicago Show.

The first of the motor coaches to be put in service by the Erie Auto Coach Company, of Erie, Pa., arrived in that city September 9.

In the 5 mile open race at Danbury, September 7, Murray Page, of Bridgeport, with his 16 horse power Locomobile (gasoline), won in 8:40.

Several Ford motor cars, from the Ford Motor Car Company, of Detroit, Mich., and the first to be seen in New York city, have recently arrived at the Thirty-eighth street office of the Ford Company.

Wm. Homey McKelvey, of Easton, Pa., has entered suit against the National Bridge Company, of New York, for \$1,500 damages for injuries to person and property sustained through running his automobile into a pile of defendants' bridge material.

After a three days' chase, ending at Westport, Conn., C. H. Gillette, of New York, has recovered the gasoline touring car recently stolen from him in Greenwich, Conn. Mr. Gillette intends to prosecute the offenders, and warrants have been issued for two suspects.

The Fisher Automobile Company, of Indianapolis, Ind., advise us that they are not connected with the newly incorporated Fisher Automobile Company, of Bridgeport, Ind., and that legal steps have been taken toward suppressing the new company's use of the name.

George W. Folsom, chauffeur for J. Montgomery Sears, of Boston, Mass., has been sentenced to six months in the Worcester House of Correction on a charge of assault, for running into and wrecking a carriage on June 16, last, severely injuring a young woman occupant. An appeal has been taken and bail furnished.

The large Herschmann steam truck, which competed in the Commercial Vehicle Trials, last week made a trip from New York city to Plainfield, N. J., and back, carrying a 3 ton load of furniture from the Columbia Storage and Warehouse, New York, to Plainfield in nine hours' running time. The distance is said to be 60 miles for the round trip.

We mentioned in our last issue that the Locomobile Company of America, a New York corporation, had made application for voluntary dissolution. This item has led to some misunderstanding, having led some readers to think that it referred to the Locomobile Company located at Bridgeport. This latter company is a West Virginia corporation, but formerly had its offices in New York city. Any company with its head offices in New York must pay a certain tax, and this made it convenient to incorporate in New

York State also. When the head offices of the company were removed to Bridgeport there was no further need for the New York corporation and it dissolved.

Bell & Co., of 250 West Eighth street, New York, have consolidated with the De Witt-Allen Auto Co., of 2208 Broadway.

It is said to be settled that the Pope Manufacturing Company will manufacture automobiles in their bicycle plant at Hagers-town, Md.

North Attleboro, Mass., claims to have the youngest licensed automobilist in the world in the person of Therson S. Curtis, who is ten years old.

Mr. and Mrs. Elmer Apperson and Mr. and Mrs. George Bruner, of Kokomo, Ind., are on their way to New York city to enter the 600 mile tour of the A. C. A.

Walter C. Martin has disposed of his interest in the Cadillac Company, of this city, to Horace B. Day, and the new firm will be known as the Cadillac Company of New York.

The Waltham Manufacturing Company, of Waltham, Mass., makers of the Orient machines, are now preparing to place on the market four cylinder, air cooled touring cars, with bevel gear transmission.

Philip Schmidt, of Long Branch, N. J., is suing W. Campbell Clark, of Newark, N. J., for \$20,000 damages to Philip Schmidt, Jr., who was knocked from his bicycle and run over by defendant's automobile.

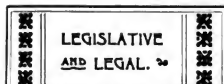
While riding in an automobile through Schermerhorn street, Brooklyn, N. Y., on September 10, Miss C. Andrews, of that city, was rendered unconscious by a stone thrown by a small boy. Her companion captured the youth after a ten block chase.

Dr. Medcraft, of Springfield, will, it is reported, abandon his proposed test of the constitutionality of the Massachusetts automobile law at the solicitation of prominent automobilists, who fear that the overthrow of the present law would result in the passage of a far more irksome statute.

Several Herschmann steam trucks, to be used by the Manhattan Express Company, of New York city, are now nearing completion at the Columbia Engineering Works, in Brooklyn, N. Y. These vehicles will have a hauling capacity of about 3 tons and are built with closed bodies to protect the load.

The Mohawk Automobile Company, recently organized in Detroit, Mich., has changed its name to the Lafayette Automobile Company, there being an Indianapolis concern which is entitled to the first name. Mr. James E. Davis, president of the new company, states that two types of machine will soon be placed on the market.

At a meeting in Syracuse, N. Y., on September 12, President Smith, of the New York State Association of Automobile Clubs, was empowered to appoint a committee composed of one member from each club in the association to draft a constitution and bylaws. Letters from prominent automobilists urging that the association be made a division of the A. A. A. were read.



The city council of New Orleans, La., is about to take action on a proposed automobile ordinance.

The city clerk of Lansing, Mich., has issued over fifty licenses at \$1 each since the new local ordinance was passed.

The park board of St. Paul, Minn., have finally decided that automobiles shall not run on the Indian Mounds road, on account of the dangerous bluffs that border it.

In Logansport, Ind., on September 2, an automobile street car and vehicle ordinance was passed, by which the first named vehicles are restricted to speed limits of 6 and 12 miles an hour.

The common council of Grand Rapids, Mich., has before it a proposed automobile ordinance which requires the initials of owners on the backs of their machines in 4 inch characters. Duplicate initial combinations must also bear numbers to distinguish them.

The chief of police of St. Joseph, Mo., has instructed his subordinates to arrest all automobilists driving machines on which the local license fee of \$10 has not been paid. An ordinance is now before the common council in which the fee is reduced to \$5.

David Wolfe Bishop, of New York city and Lenox, Mass., has been summoned to answer to two complaints in the district court at Lee, Mass., on charges of violating the automobile ordinance of Lenox, Mass., and the State law requiring automobiles to be licensed.

The proposed automobile ordinance for New Orleans, La., which is similar to the one now in force in Chicago, is now before the New Orleans City Council. At a meeting held on September 7 the New Orleans Automobile Club decided to take the members of the council out in their machines, to demonstrate the safety and control of the self propelled vehicle.

A. L. A. M.

The Mitchell-Pierce Motor Company, a merger of the Wisconsin Wheel Works and the Pierce Engine Company, has been admitted to membership in the Association of Licensed Automobile Manufacturers. A. J. Pierce, of the Pierce Engine Company, has been identified with the gas engine business for eighteen years, and built his first automobile in 1893.

It is rumored that a combination of foreign automobile manufacturers with millions of its own and plenty of backing in Wall street has been effected, and will fight the Selden patent monopoly. The rumor is so far unconfirmed, although many believe it to be founded on fact.

Accidents.

A fatal automobile accident occurred near Rochester, N. Y., on September 4, in which Miss Maud King was killed by the overturning of a machine at the foot of a hill.

At Syracuse, N. Y., on September 12, Dr. John Grant Lyman, Arthur W. Brand, W. T. Rynard and A. Dietz were plunged into the Erie Canal by running an automobile at high speed through an open drawbridge. Machine and passengers were rescued without serious injury.

An automobile occupied by Mr. and Mrs. Frank Close, of Olean, N. Y., went over a 15 foot embankment near Salamanca, N. Y., on September 4. The accident occurred in an effort to steer around a bad hole in the road at high speed. Neither occupant was seriously injured.

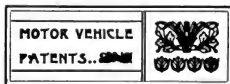
While giving an exhibition of speed at the Zanesville (Ohio) County Fair on September 9, Earl Kiser, of Dayton, Ohio, lost control of his machine; it crashed through the fence and into the crowd, killing one man (John Gooden, of Zanesville), and injuring six others, including Kiser, who broke his ankle.

Through the breaking of a drag link in the steering gear of their automobile, an unknown man and woman were involved in a serious automobile accident at Norwalk, Conn., on September 6. The machine ran into the curb, and the man managed to retain his seat, but his wife was thrown over the dash, breaking her nose and otherwise disfiguring her.

By carelessly emptying the fuel tank of his gasoline automobile, which had been filled with kerosene by mistake, J. O. Gilbert, of Wichita, Kan., caused the destruction of the machine on September 4. Discovering the error that had been made, Mr. Gilbert let the oil run on the ground, whereupon it caught fire in some unexplained manner, and soon enveloped the machine in flames.

On Saturday, September 12, Frank Day, of Columbus, Ohio, was making a trial for the world's speed record with Barney Oldfield's machine at the State Fair Park track, Milwaukee. While turning into the home stretch on the fourth mile the machine turned over and came down on the driver, killing him instantly. The machine turned over several times, tore away about 50 feet of the fence and was completely wrecked.

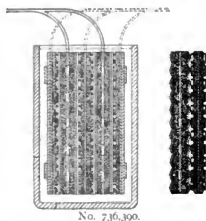
In attempting to climb a hill near Tuxedo Park, N. Y., in a steam automobile the machine ran backward over a bank and Miss Cornelia Herrick, of Southampton, Long Island, was killed and Dr. Edward C. Rushmore, of Tuxedo, very seriously injured. The accident was the result of opening the throttle suddenly in an effort to surmount the grade, while the link motion was in its extreme forward position. This caused the engine to reverse, as has frequently happened with steam machines using a reverse lever that does not positively lock where placed.



United States Patents.

736,390. Secondary Battery.—Geo. E. Hatch, of Quincy, Mass. August 18, 1903. Filed July 14, 1899.

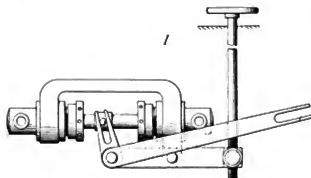
It has been found in practice that those secondary batteries in which the active material is confined by porous supports are subject to a considerable increase of internal resistance and decrease of voltage during discharge, especially when the rate of discharge is high, and it has also been found that a main cause of these disadvantages is the exhaustion of the acid from the electrolyte, which is diffused through the active material more rapidly than it can be renewed from the outside surrounding fluid by percolation through the porous supports. A further cause is the accumulation of gases generated by the



discharge of the battery, which gases, unless their free escape is in some way provided for, gather in the pores of the active material and porous supports and exert an electromotive force which is counter to that of the battery itself.

The present invention is intended to overcome the above objections, and to that end it employs rigid porous supports for the active material of the positive pole electrodes only, and combines therewith negative pole electrodes so constructed that their chemically active surfaces or the greater portion thereof will be freely and directly exposed to the contact and action of the electrolyte without the interposition of an inert porous mass through which the electrolyte must percolate in order to reach the surfaces, and through which the gases generated at that electrode must pass in order to escape from the cell.

The negative electrodes are constructed as follows: A temporary receptacle or support is provided, adapted to receive a shallow layer of red lead, which support is given the form of a shallow tray made of light porous wood and provided with a number of holes piercing its bottom. The material to become active is filled into



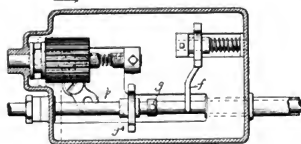
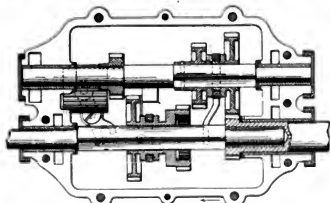
No. 737,332.

the tray and holes until it is level with the edges of the tray, and a thin plate of metallic lead which is to become the corresponding conducting plate is then placed against the filled side of the support. When it is desired that the plate shall have active material on both its faces, as is usually the case, a filled support is placed on each side of said plate.

737,332. Pump Regulating Mechanism.—W. C. Bucknam, of Geneva, Ohio. August 25, 1903. Filed March 28, 1902.

This pump is especially designed for feeding the water to the boiler of a steam automobile, and the adjustable delivery, accomplished by varying the stroke of the pump, obviates the necessity of by-pass valves to prevent the undue feeding of the boiler.

A pair of plunger pumps are located opposite and in line with each other, having a common plunger. This plunger is operated by means of a bell crank with forked ends, one fork passing over a pin on the plunger and one over the pump operating pin on the crosshead of the engine. The bell crank is pivoted at the end of a double armed lever and the pivot can be moved by means of a screw and



No. 737,442.

nut arrangement actuated by a hand wheel near the seat.

737,442. Change Speed Gearing.—Louis P. Mooers, of Cleveland, Ohio. August 25, 1903. Filed June 16, 1902.

A shifting gear giving three forward speeds and reverse and direct drive on the high gear. It comprises two sets of shifting pinions—one on the driving shaft and one on the countershaft. The clutch connection for direct drive is obtained by means of an internal gear forming a part of the set of sliding pinions on the driving shaft, which exactly fits over the pinion on the clutch shaft. Normally one of the set of sliding gears on the countershaft is in mesh with the pinion on the clutch shaft, being held in that position by a coiled spring, and before the internal gear begins to mesh with the clutch shaft pinion the countershaft gear must have been moved entirely out of mesh with the latter. This is accomplished by means of an arm *f*, against which a pin *g* on the control rod abuts when the movement of this rod is continued by the driver beyond the position of second speed. The reverse is obtained by means of an intermediate pinion which is ordinarily held out of mesh with the low speed pinion by a coiled spring, but which is moved into mesh with it as soon as the low speed gear has passed out of mesh with the low speed pinion, as the operating rod is moved from right to left in the illustration. This is accomplished by means of another shifting lever *p* and another stop *g'* on the shifting rod.

738,188. Secondary Battery.—George E. Hatch, Quincy, Mass. September 8, 1903. Filed February 13, 1899.

738,241. Motor Vehicle.—Winfield S. Rogers, Keene, N. H. September 8, 1903. Filed January 24, 1902.

738,315. Water Level Indicating Apparatus.—Max Gehre Rath, Germany. September 8, 1903. Filed July 9, 1902.

738,415. Cushion Tire for Vehicle Wheels.—Jules N. Dages, Brussels, Belgium. September 8, 1903. Filed April 8, 1903.

738,442. Boiler Alarm.—William C. Heitkamp, Pleasantridge, Ohio. September 8, 1903. Filed June 23, 1902.

738,559. Motor Bicycle.—Johannes W. Meijer, Velp, Netherlands. September 8, 1903. Filed January 10, 1903.

738,683. Speed Indi-

cator.—Edgar J. Hodgson, Minneapolis, Minn. September 8, 1903. Filed August 28, 1902.

738,718. Galvanic Cell.—Lothar Fiedler, London, England. September 8, 1903. Filed December 22, 1902.

736,999. Chain Driving Gear.—Everett F. Morse, Trumansburg, N. Y. August 25, 1903. Filed March 10, 1899. Renewed March 21, 1902.

737,001. Reversing Gear Mechanism for Engines.—John P. Moskop, Monrovia, Ill. August 25, 1903. Filed March 26, 1903.

737,007. Vehicle Wheel.—Nelson A. Newton, Kalamazoo, Mich. August 25, 1903. Filed November 17, 1902.

737,081. Machine for Making Battery Grids.—Thomas J. Coster, Depew, N. Y. August 25, 1903. Filed September 2, 1902.

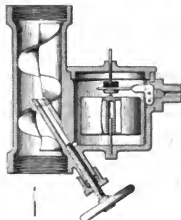
737,202. Electrical Ignition Device.—Everett W. Brooks, Chicago, Ill. August 25, 1903. Filed September 23, 1901.

737,237. Speed Gear for Motors.—Albert B. Holston, Chicago, Ill. August 25, 1903. Filed January 6, 1902.

737,463. Vaporizer for Explosive En-

gines.—Carl F. Pearson, of Chicago, Ill. August 25, 1903. Filed February 14, 1903.

The vaporizer is of the float feed spraying type and is characterized by having



No. 737,463.

the float operated needle valve in the side wall of the float chamber and a spiral partition in the spraying chamber.

737,250. Steam Boiler.—Asa W. La France, Elmira, N. Y. August 25, 1903. Filed November 14, 1902.

737,285. Battery Element.—Charles B. Schoenmehl, Waterbury, Conn. August 25, 1903. Filed May 19, 1902.

737,294. Steam Engine.—William Sutcliffe, Paterson, N. J. August 25, 1903. Filed August 2, 1902.

737,517. Boiler.—Francis E. Stanley, Newton, Mass. August 25, 1903. Filed June 21, 1901.

737,532. Sparking Igniter for Gas Engines.—Benjamin L. Toquet, Westport, Conn. August 25, 1903. Filed April 3, 1902.

737,558. Steam Boiler.—Asa W. La France, Elmira, N. Y. August 25, 1903. Filed November 14, 1902.

737,559. Tire.—Charles Miller, Binghamton, N. Y. August 25, 1903. Filed November 29, 1902.

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Devoted to
Motor
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Tire Manufacturers Prescribe Conditions of Use.

An agreement has been entered into by all the leading tire manufacturers whereby they bind themselves, when supplying tires to customers in the future, to insist upon wheels carrying a certain weight to be fitted with tires of a given size, and to require rims of specified form to be used with their tires. Undoubtedly the compact also contains provisions relating to other matters, such as maintenance of prices, but the effort to insure the most rational use of tires is certainly the most important feature of the agreement.

In our estimation the tire manufacturers have a perfect right to specify the sizes of tires to be used, and also the forms of rim. The automobile manufacturers in their "warranty" disclaim any responsibility for any defect which may develop in connection with the tires, and the tire manufacturers themselves guarantee their performance and replace tires free of charge during a certain period. Of course, all guarantees contain a clause limiting the guarantor's liability to damages due to defective material and workmanship, which would offer a loophole of escape in many cases, but it is an established fact that most of the tire manufacturers have been extremely liberal in the matter of free replacements, "for the sake of reputation." The tendency of some manufacturers to use tires of insufficient width on their cars has been the cause of much unsatisfactory experience with tires and of great losses to the tire manufacturers. In fact, it can be said that free replacements have consumed the major portion of the profits in the tire business, and it is therefore only natural that the tire manufacturers should attempt to put a stop to abuses of their goods.

The chief reason for the adoption of too small tires in many cases is undoubtedly the consideration of first cost. The lighter weight of the smaller tires and their rims may also have had its influence with some

manufacturers, as the lighter the weight the more powerful, relatively, the car. The user, however, has had to suffer from the use of too small tires in a number of respects. In the first place, even if the tire manufacturer makes repairs or renewals free of charge, frequent tire troubles are most aggravating. The smaller tires, moreover, have less cushioning effect—i. e., are less comfortable to ride on, and are less efficient in protecting the mechanism. The user can therefore only be the gainer by this decision of tire manufacturers.

Automobiles and Motor Boats.

The entire European automobile press during the last few weeks has printed lengthy accounts of a motor boat race from Paris down the River Seine to the Atlantic Ocean, which seems to be regarded as an automobile event. The great interest which has been shown in this boat race is evidently traceable to the prohibition of automobile races. In France these boats are generally referred to as automobile boats, and most of the boats entered in the race were equipped with motors of some automobile manufacturer. The motor launch industry is for this reason looked upon abroad as an outgrowth of the automobile industry.

There is, of course, some relation between automobiles and motor boats, both being at present principally pleasure conveyances, and appealing therefore to the same classes of society, but there is little probability of an alliance or amalgamation of the automobile and motor boat industries in this country. Here the development of the motor boat preceded the development of the automobile, and in 1895, when the automobile industry was born, the motor launch business was already in flourishing condition. There is no probability of an amalgamation of the two industries, for the reason that essentially different qualities are required in a launch

motor from those needed in an automobile motor. Just as it was impracticable for the early automobile inventors to adopt launch motors for their purpose—some tried it, but gave it up—so it is impracticable to use the modern automobile engine for launch purposes—except for racing launches. A vertical automobile engine (all launch engines are vertical) is necessarily a comparatively high speed engine, and requires a reduction gearing when used on a launch. Most of the boats which participated in the "Paris to the sea" race were fitted with such reduction gearing. In racing boats this disadvantage is slight in comparison with the advantage of the great power developed by the high speed motor, but in ordinary pleasure launches the simplicity of direct propeller connection is valued higher than the saving in weight which a high speed motor combined with reduction gearing would permit, and special slow speed motors are therefore used.

The Licensed Association and the Show Question.

It is learned that the Association of Licensed Automobile Manufacturers is planning a coup for the coming Madison Square Garden show. At the stands of all the members will be displayed signs to the effect that the exhibitor is a member of the A. L. A. M. and warning visitors not to buy of any but a licensed manufacturer. As practically all the members of the association are now calling attention to their membership in the Licensed Association in their advertisements and the association is warning prospective purchasers against buying from unlicensed makers, there would be absolutely nothing startling in this proceeding, but the effect at the show would be felt more keenly by the unlicensed makers, because among the visitors would be many totally unfamiliar with the condition of affairs, who would be strongly influenced by signs displayed at nearly all the stands containing in substance a warning against dealing with exhibitors outside the pale. With these prospects in view, it is not likely that unlicensed manufacturers will apply for space at the New York and Chicago shows, and the N. A. A. M. shows will therefore be dominated by the A. L. A. M. The Licensed Association is also dominant in other affairs of the National Association. For instance, it is extremely doubtful whether gasoline cars will be entered in the endurance run

to Pittsburg by any but licensed manufacturers. The formation of the Licensed Association may yet lead to a secession in the membership of the N. A. A. M., and there is already some talk of an opposition show.

Probable Expansion of the A. A. A.

Some months ago the American Automobile Association adopted a plan for the formation of State divisions which would make it possible to follow more closely the trend of legislation in the different States and do more effective work in this line. Almost simultaneously the New York State Association of Automobile Clubs was formed to oppose the passage of the Bailey law. The latter organization combined practically all of the local clubs outside of New York city, while only three clubs in New York State—the A. C. A., the Long Island A. C. and the Rochester A. C.—are as yet members of the A. A. A.

Negotiations have been carried on during the past week, and will probably be concluded before the end of this week, whereby the N. Y. S. A. A. C. is to become affiliated with the A. A. A. The clubs composing the State association are to come into the national association individually and to have one vote in the affairs of the national association for each active and associate member, the same as the present clubs of the national association. One important provision in the terms of affiliation is that one-half of the initiation and membership fees of the new accession to the A. A. A. are to be returned into the treasury of the State association. These terms seem satisfactory to both sides, although they have not been finally adopted at this writing.

The A. A. A. is to be congratulated on this strong accession to its ranks, which will greatly augment its power and influence for the good of the automobile movement. It is to be hoped that the example of the New York State clubs will soon be followed by other clubs not yet members of the A. A. A. Ohio, for instance, has a powerful State organization, the affiliation of which with the national body could only result in mutual benefit. The same applies to clubs in other States not yet organized into State organizations. There are at present nearly 100 automobile clubs in the United States. With the clubs of the New York State association the A. A. A. will have a membership of about fifteen

clubs, but these are nearly all important clubs, and the voting membership of the A. A. A. will probably be nearly one-half the aggregate club membership of the country.

As the legislative propaganda will undoubtedly start anew at the beginning of approaching sessions of the various State legislatures, the time for organization is decidedly appropriate. With systematic organization and with the experience of the general trend in automobile legislation gained last year, much more effective work will be possible than heretofore.

The Cooling Problem.

In touring cars the use of the cellular cooler with fan is constantly increasing to the exclusion of tubular or coiled radiators. The cellular cooler has given recently remarkable results in the way of water economy and its use in high powered cars is therefore quite appropriate. We believe, however, that a powerful factor in the adoption of this type of cooler is the fashionable cult of the so called Mercedes front, for although a front giving almost the same effect can be obtained with a coiled cooler, it would be somewhat of the nature of an imitation and not "the real thing."

While the cellular cooler possesses a very important advantage in its water economy, it is also open to a number of serious objections. First of these is the high cost of construction, due to the great amount of labor necessary. In case the owner of a 40 horse power Mercedes in this country should have the misfortune to damage his radiator beyond repair, a mishap which has occurred and is quite likely to occur in view of the exposed position of the apparatus, he will be subject to an expense of about \$700 to get a new one, or more than the cost of an American runabout. In addition, cellular coolers with a multitude of tubes are inclined to develop leaks, and these leaks are very difficult to solder up.

The coiled radiator does not have the same mechanical appearance as a cellular radiator, but is in little danger of being replaced by the latter type of apparatus in the popular types of vehicles. It is cheaper to construct, easier to keep in repair, and when advantageously located on the vehicle is quite efficient in disposing of the heat absorbed by the jacket water and in preventing the boiling away of the water. The radiator tubes seen on cars a year or two ago were often of a very unfinished and irregular appearance, but since a number of

firms have taken up radiator construction as a specialty there has been a notable improvement in this direction.

Calendar of Automobile Dates and Events.

September 25-October 1.-Club Run of the A. C. A. to Boston and back.
 October 3.-Race Meet at Empire City Trotting Club, Yonkers, N. Y.
 October 4.-Paris Cab and Delivery Wagon Trials.
 October 6-14.-New York-Pittsburg Endurance Contest.
 October 10.-Race Meet of Automobile Club of Philadelphia.
 October 21.-Brighton Beach, New York, Race Meet.
 December 10-25.-Paris Automobile Exhibition.

Nervous Strains Due to Automobile Driving.

BY ALBERT L. CLOUGH.

The question is often asked by persons who are not motorists, "Isn't guiding an automobile terribly fatiguing?" In answer to this interrogatory the average operator will say "No" in defense of his favorite sport, and try to remember only his perfect runs over ideal roads. The acutely conscientious automobilist will, however, make an answer full of reservation and will bear in mind some of his attempts to make high speed over sandy and hilly roads with a heavy freight, an underpowered machine of somewhat questionable reliability, and perhaps of odd gauge. He will have visions, too, of horses on their hind legs and the frightened owner and his numerous family behind the rearing beasts.

The fact is that the strain arising from driving a motor vehicle may be almost nothing, or it may be intense and very wasteful of nervous energy, according to conditions.

I have a friend who is strong and healthful, but who lives in a very rough and sandy part of New England, where roads are narrow and horses timid. He tells me that after a 50 mile drive in his section he finds himself practically exhausted and has very little ambition for business the next day. Other friends tell me that they find nothing so restful as a spin with their machines after a period of close application to business. These gentlemen are all undoubtedly candid and all probably correct. The difference in individual makeup and the conditions of driving probably account for their diametrically opposed experiences.

Among the sources of nervous strain in automobile driving may be mentioned the following:

1. Hard road conditions, including sandy or rough road surfaces and difficult and dangerous grades and turns.
2. The attainment of high speeds, which call for an unusual degree of alertness.
3. The possession of a vehicle of a gauge not uniform with those in use in the country being traveled, or one fitted with a steering gear imperfectly irreversible.

4. The dread of frightening horses which may be encountered.

5. The possession of a vehicle which is operating imperfectly in some respect.

6. The possession of a vehicle which is underpowered and which requires the exercise of the utmost skill to make it travel successfully.

7. The possession of a vehicle which is known to be unreliable and which at any moment may develop a defect.

8. Night driving.

1. Difficult road conditions are beyond doubt the chief cause of strain. In driving upon broad, smooth and nearly level highways the miles may be reeled off at a surprising rate for hour after hour, with practically no attention from the operator other than that mild and almost subconscious activity which merely occupies and does not in the least strain the attention. An operator may actually become drowsy when traveling roads like these. The regular hum of the mechanism and the purr of the exhaust, the soft breeze blowing in his face, and the smoothness of the motion combine to put the faculties in a most restful condition. Steering motions under these conditions become almost imperceptible and almost perfectly automatic, and the application of the power is accomplished almost subconsciously, the slowing down of the vehicle on a slight up grade being met by a slightly involuntary opening of the throttle and its acceleration upon a down grade being infallibly answered by the opposite action.

How painfully increased the nervous strain may be under opposite road condition is a matter of experience to everyone who has done any genuine touring. It is rather surprising that so little has been said upon this matter or that its conditions have been so little analyzed, for the future of the automobile as a pleasure vehicle is seriously concerned with the decision of the question, whether operating a motor car over average American roads is really pleasurable sport or hard and nerve racking work.

Consider one of the narrow unimproved country highways, such as unfortunately are found in most of the really scenic parts of the country. It contains frequent grades ranging from very moderate inclines up to ascents of 20 or 25 per cent. They are generally decorated with numerous water bars or "thank you ma'ns," and with mineral remains of the kind which "gather no moss," but do gather in many a punctured tire. The sand which once covered these rolling stones is usually washed to the bottom of the hill to form a speed reducing and momentum destroying impediment. The level stretches of the road (if there be any) consist of three ruts in the sand or clay, having a gauge dependent upon local taste. The road usually contains all kinds of curves and kinks, except when hills are encountered. There

it is usually "surveyed" straight over the worst "bunch" to be found.

The operator is not in danger of falling asleep when traversing such highways. There is enough to do even when there is "nothing to watch but the road"—which certainly will bear watching.

Steering along the ruts of a sinuous road is enough to keep eye and hand in constant activity, for the wheels must be kept in the track if reasonable comfort is to be enjoyed or fair usage accorded the machine. When nearing a hill one is prompted to throw on full power in order to "rush" the sand at the bottom of it. With a gasoline vehicle the gear must be reduced at the proper moment to prevent the stopping of the vehicle, and perhaps an even lower gear must be thrown in later if the grade is a bad one. With a steam vehicle there is constant anxiety in regard to the steam pressure and water supply in overcoming these hard conditions. When the top of the hill is reached one has to throw off the power and pilot the car down the decline under brake control, with due regard for the water bars which are lying in wait to break the springs or strain the running gear of the careless operator's car. Then the high speed may be picked up and the same performance repeated. All the while the tires must be as far as possible guided away from contact with sharp stones or protruding ledges.

Now, I am well aware that a certain amount of nervous activity or strain is the very essence of sport, at least from the Anglo-Saxon standpoint, and it is generally true that the extent and seriousness of the difficulties successfully encountered measure roughly the degree of true sport enjoyed. It is the intelligent activity of eye and brain and hand and foot necessitated in motoring over rough roads that constitutes automobilizing the king of sports, but, nevertheless, it is true that to drive hour after hour under conditions like the above is nervously fatiguing. This is no objection raised against automobilizing, but merely a statement of fact. It is nervously fatiguing to stand at the wheel of a yacht in bad weather, and yet it is great sport and constitutes sport in exactly the same way.

2. It is the speed factor which more than any other is at the bottom of the nervous strain experienced in motor car driving. Almost any sort of road conditions may be traversed without undue strain if the speed be low enough. When this is the case the degree of alertness necessary to secure successful running need not be intense. But the idea of high speed is inextricably bound up with the conception of the automobile in the mind of almost everyone. Self propelled transportation means propulsion at speeds greater than obtainable by animal power. The love of high speed is one of the passions that is deeply and almost universally implanted in human nature, and nine out of every ten operators are not satisfied unless

they are developing the last mile of speed of which their vehicles are capable under the conditions at hand. Many an operator starts out with a resolution to run very moderately and take things easily, but he finds the throttle gradually working wide open whenever the inhibitive power of the resolution is not consciously exercised.

I think that only a small proportion of operators ever go out for a drive solely imbued with the idea of being out of doors and enjoying nature. Some ideas of time and space—that is, speed—are pretty sure to intrude themselves. "How long did I take to do it in last time?" or "How many minutes did Jones say he made it in?" are questions that are generally in the driver's mind. One is very likely to have a speed ideal in the background of consciousness and unconsciously act upon it. Then, again, the operator of a vehicle does not realize so well as do his passengers how fast the vehicle is moving. The operator is looking directly ahead, and even at good speeds the objects which he sees do not appear to approach at the rate which objects do that are seen from the sides of the vehicle by the passengers. It is a common illusion that a vehicle is moving faster when another is driving than when one is driving oneself.

Certain conditions sometimes influence an operator to drive a gasoline vehicle faster than he otherwise would, in order to keep upon the high speed. Every operator of this motive power is aware that his fuel economy will be greater and his wear and tear less if he can keep his highest or direct gear in action most of the time. Its operation will be smoother and quieter, too, without the gears. Now the speed and torque relations of the gasoline engine are such that a maximum steady pull cannot be obtained at very low engine speed, but only when considerable speed is developed. If it is attempted to run very slowly through bad road conditions, on the highest gear, many gasoline engines labor badly and make hard work of it. Under these circumstances it is often the tendency to increase the speed somewhat in order to keep the engine at such a rate of rotation as to avoid the pulsation and evidences of labor which would be noticeable at a lower rate. If the highest gear is lost by undue slowing down on a long sandy stretch or protracted up grade it will often be impossible to engage it successfully again until easier conditions are encountered, which may be only after a considerable interval. There is, then, a strong temptation to attack somewhat hard road conditions at high speed with a gasoline car.

With a steam vehicle the tendency is just the opposite, as strong pulling ability is dependent upon boiler pressure only and independent of the speed, and one is likely to take long, difficult stretches at low speed in order not to reduce the boiler pressure. There is thus likely to be a little more strain due to running at high speed in the

operation of a gasoline than a steam vehicle, but this counterbalanced by other anxieties respecting the motive power in the case of the steam car.

The temptation toward high speed, if yielded to, involves a degree of concentration which is wearing in more than a direct ratio to the velocity attained. On bad roads, the steering operation may require all the attention and some muscle, if the best parts of the way are to be picked, rocks avoided, and water bars or gulleys met in a safe manner. To avoid slewing or skidding under certain conditions at high speed, the utmost dexterity with the steering gear is demanded, and the following of ruts requires a degree of interest in the wheel rapidly increasing with every attempt to make time. Of course, any increase of speed demands an ability to act with force and celerity in any emergency, such as a sudden stop, at least in proportion to the square of the increased pace.

(3) It is a sad fact that by no means all the motor vehicles manufactured are of the same gauge. While there is a strong tendency toward the adoption of 56 inches as a standard, there are a great many cars built which are 4 inches less than this and some which are of very much less width. The fact that ordinary wagon gauge varies in different parts of the country tends strongly to complicate the problem of standardization.

Driving a motor vehicle over a rutted road made by wagons of a gauge different from its own is productive of an incessant strain upon the operator, not to mention the machine itself. It is only possible to keep the wheels on one side of the car in the rut. The wheels of the other side are then traveling through the worst kind of footing. Nor is it easy to even keep the wheels of one side in the rut continuously, for there seems to be a tendency for the vehicle to "wobble"—with its right and left hand wheels alternately in the rut. Steering under these conditions, is a matter for close and constant attention. With a vehicle the gauge of which is the same as that of ordinary traffic, the wheels follow the ruts very nicely, and the strain due to steering is largely eliminated.

There are still a good many vehicles in use having steering gears which are imperfectly irreversible in their action, and the strain of guiding these cars over bad roads is unnecessarily severe. The possibility that the encountering by the front wheels of a bad portion of the road may suddenly jerk the steering tiller out of the operator's hand, cramp the wheels and ditch the machine is ever present, and the only manner in which it can be met is by constantly maintaining the steering arm in a state of rigidity intense enough to resist any tendency to move in either direction. This is exceedingly fatiguing, as the writer can assert from personal experience, and it is perfectly inexplicable why so many machines

are still made with steering gears not irreversible.

4. To every automobilist who possesses ordinary human sensibilities (and this fortunately includes almost all users) the safety of the horse drawn traffic upon the roads he frequents should be of the first importance. The terror awakened in horses by the motor vehicle, while almost a thing of the past near large cities, is still a grave consideration in the really rural districts. The possibility of meeting at a sudden turn in the narrow road a wagon crowded with people and drawn by a horse which may instantly throw off its thin veneer of domestication and become as truly a wild animal as its untamed brethren of the plains, with all the possibilities of loss of human life and limb, is not such as to make automobiling in these regions free from care. I know of more than one owner of a motor vehicle who has given up using his machine in his home district solely on account of the liability of causing accidents to his neighbors' teams. These men keep their machines in a neighboring large city and go down occasionally to enjoy their use where their neighbors are not present with their scowls or their remarks. In "truly rural" districts each horse that is met presents a new problem to the operator, and with hand on the lever he awaits results. Sometimes the horse goes into hysterics and the driver keeps cool; far oftener the opposite is the case, especially with lady drivers.

One cannot contemplate the possibility of a runaway with true inward tranquillity, and, although the usual result is that the supposedly intractable horse begins to feed off the neighboring bushes, the exceptions constitute exhibitions seldom seen outside the sawdust ring and which are not productive of perfect nervous equanimity.

It is indeed fortunate that horses are very rapidly losing all fear of the motor vehicle, and it is quite possible that their owners may do the same in time.

5. To the trained mechanical intelligence there is nothing more genuinely distressing than to operate a mechanism which is not perfectly performing its functions. To be conscious that anything is wrong, that any part has worn or is wearing beyond the normal, that there is any looseness or lack of adjustment at any point, or any irregularity in the action of the motive power, is to feel a sense of disquiet which amounts to uneasiness and imposes a strain which increases with the degree of mechanical conscientiousness possessed by the driver. Oftentimes the passengers do not know that anything is wrong and are enjoying themselves hugely, while the operator is having a miserable time. This is a case where ignorance is bliss. "Missing" is probably about as disturbing a symptom as a gasoline car can develop, as it violates the deep human fondness for the "rhythmic," and produces about the same

sensation as arises when one listens to irregular heart action, particularly one's own. These annoyances are fortunately preventable, and if one neglects to obviate them no one else is to blame.

6. If one attempts to operate a machine which has not an abundance of power for the service in hand it will be at the expense of a somewhat incensed nervous strain.

It will be necessary to push the machine to its utmost to make it do the work, and there will be none of the confidence and sense of security which arises from the possession of a large surplus of engine power, but one will constantly be on the qui vive to see if the vehicle is going to pull through. The careful "nursing" which an underpowered machine requires to enable it to overcome severe conditions absorbs all the attention of the operator, who has no time to devote to the scenery. If it be a gasoline car, there will be long stretches of low gear work with its inevitable waste and wear, and all the easier stretches will have to be "rushed" in order to keep on the high speed as long as possible. If the car be a steamer, there may be long waits for the pressure to rise to its normal after hard work. If the least thing goes wrong with an underpowered car the chances are strong for a failure to travel successfully, as there is no margin of power which may be drawn upon.

7. There are some vehicles which are known to be unreliable and to have certain "outs" which are likely to make themselves manifest at any moment, and it is not a remedy for neurasthenia to drive one of these. The passengers may be in happy ignorance of the particular bad habits to which the car is prone, but the operator is pretty likely to sit with aires erect to catch the first intimation of trouble.

8. The operation of a motor vehicle through narrow country roads by night solely by the light from its own lamps is found by many operators to impose quite a severe strain, especially if the roads are entirely new to the driver. Ordinarily lamps do not light very far ahead, especially on winding roads, and the operator must be sufficiently alert to meet any emergency in a shorter space of time than usually allowed him in daylight. Automobile lamps are usually pointed directly in line with the length of the vehicle and thus do not necessarily light the road ahead on short curves or grades of rapidly changing pitch. The shadows cast by slight inequalities of the road are so hugely exaggerated in the nearly horizontal beam of the lamps that a slight undulation in the highway may appear like a deep gully and apparently call for a sudden slowing up which proves to be entirely unnecessary as the insignificant character of the obstacle is revealed by the nearer rays of the lights.

The effect when climbing a hill is most

peculiar and uncanny. The road appears to absolutely end at the top of the slope where the light beams are tangent to the road surface and everything beyond is shrouded in inky darkness.

It requires a distinct act of the reasoning faculty to banish the impression that all beyond the top of the hill is a void, but everything straightens out all right as the crest of the hill is passed.

There is something weirdly picturesque in the flashing into view of the various landmarks of the road as they come successively into the very sharply circumscribed area of intense white illumination that goes far to give night driving an æsthetic value of its own. To see a horse and team suddenly spring into being at a few feet distant as the light swings around a sharp turn may call for some quick work, but it seems to be a fact that horses very seldom run away under these conditions.

In order to avoid undue strain in motor driving it is necessary to eschew all attempts at high speed (particularly over bad roads) and the traveling of strange roads by night; to drive a vehicle of standard gauge with a perfectly irreversible steering gear, ample power for all emergencies without the necessity of forcing, and one which is kept in the pink of condition. Horses will soon be universally broken to the self-propelled vehicle and, in the course of time, good roads may be expected to replace a majority of the execrable trails now dignified by that name. When all these conditions are fulfilled the answer to the question which begins this article may be truthfully and unequivocally "No."

The Prevention of Backlash in Automobile Steering Gear.

By J. S. V. BUCKFORD.

I suppose that there is scarcely a driver of an automobile steered by wheel who has not had some experience with worn and loose steering gear. With such a gear it is almost impossible to run fast, and much of the pleasure of driving is lost. Up to the present there appear to have been few attempts to overcome this

trouble by any other means than perfection of workmanship. I believe that the difficulty can be met in other ways, and a defective steering gear can be made reliable and comfortable to use.

Backlash in a steering gear is due to slackness of the joints, and, as there are several of these between the hand wheel and the steering pivot, it is very easy to get such an amount of play in the gear as to almost make it useless.

Now, it will at once be seen that if the steering wheels were constantly tending to run in one direction only, slackness of the gear would be of no consequence. It is because the resistance of the road to each front wheel is equal and because, in consequence, on an average the car tends first to one side and then to the other, that slackness in the gear is so objectionable, so that if we can find any means of causing the steering wheels to constantly tend toward one side we shall have done something to cure the trouble. In an old gear on an existing car this is the only way of meeting the case, except by structural alterations.

The best way to accomplish the object on an existing car is to use a fairly elastic spring. Lay the steering wheels over one side as far as they will go, and then fasten a spring capable of about 8 inches elongation, with a pull of 200 pounds, hand tight, from one end of the fixed axle to the steering arm at the other end, as shown at A in Fig. 1. Now bring the wheels back to mid gear, and it will be found that the spring is strained to perhaps 50 to 70 pounds. In a car of average weight this is quite enough to keep the wheels hard over to one side, and the steering wheel being irreversible, the pull of the spring is not felt by the hand. The writer has used this arrangement on his car and found it to work excellently. The other day the spring fixings came off in the middle of a run, and the effect was most noticeable. While before the spring was carried away one could practically sit still and do nothing so long as the road was straight, afterward one had to be constantly tinkering with the wheel.

It is possible that the above object could

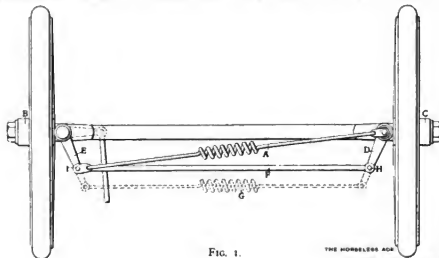


FIG. 1.

THE HORSELESS AGE

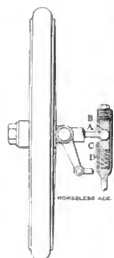


FIG. 2.

plished in a more slightly way by making the steering arms E D of unequal length.

It is, however, probable that the same result can be accomplished far better in still another way. The method is that adopted by all the best European builders in the connecting rod between the steering gear and front wheels. The ends of this are almost always ball and socket joints, and a fairly strong spring is introduced into each socket, as shown in Fig. 2, which is a sketch of the gear used by the writer and something similar to that used on the Panhard cars. It will be seen that the ball A on the end of the short steering arm is held between two steel dies B C. One of these dies presses against the socket or its cap, while the other is compressed by a strong spring D. Not only does this serve in some measure to take up shocks, but, what is much more important, no amount of wear in reason can introduce any backlash into the gear, for all wear possible in practice is taken up by the expansion of the spring. No attempt seems to have been made so far to introduce this method of compensation into the other joints of the gear, but it would appear not to be at all difficult to do. Take, for instance, the connecting rod between the steering arms F, Fig. 1. All that would be necessary to take up backlash here would be to connect a strong tension spring between the arms D and E, as shown at G, Fig. 1. Obviously this would prevent backlash from slackness in the pins H I. These pins are almost sure to work loose, as the road dust has some access to them.

The only other joint in the gear is the worm and sector. This is by no means so

easy to deal with. It does not do to make it adjustable, though this has been tried in the following way: The toothed sector has been divided into two parts in a plane perpendicular to the axis of the pin (Fig. 3) and parallel to the direction of motion of the sector. We then have two complete worm sectors X and Y superimposed. If now apparatus is introduced, as, for instance, a small right and left hand screw, whereby these two parts of the sector may be made to rotate about the pin A relatively to one another, it is obvious that the backlash due to wear would be taken up. The principle is exactly the same as that used in some threaded nuts for taking up wear where a screw is used to force two nuts apart while preventing them from rotating relatively to one another. This has been suggested as a method of compensating the nuts of nut and screw steering gears. At first sight these methods seem all that is desired, but they are not so in practice. All the wear on a steering gear, practically speaking, takes place in the mid position, for it is in that position that the gear is used nine-tenths of its time. If, therefore, the gear is compensated in that position, it will be so tight as to almost jam itself when in the extreme positions, and the method will be found unworkable.

There is, however, another method which seems to me to be possible. Let the two halves of the sector as above be produced to a considerable distance toward the rear, as at B C, but, instead of having the adjusting screw at D, use a strong spiral spring. This will keep the teeth of the sector in contact with the worm even if the latter were one-quarter inch out of pitch in places, and no backlash would result.

By the adoption of these methods I believe it would be possible to entirely eliminate backlash from steering gears, though the gear so built would be considerably more expensive than the ordinary pattern. It should be needless to add that absolutely no joint about a motor car steering gear may be without a properly fitted split pin properly split. I once had the pin of the connecting rod of a steering gear come out on the road. Fortunately we were going up hill at the moment, or I should probably not be writing now. This pin, contrary to instructions, had been held in place by a very small set screw, counter-sunk into it and put in head downward. My advice to a buyer of cars is to go over all parts of his steering gear himself, even if he does not look at any other part.

Concerning the Cooling Problem.

The solutions of the problem of cooling the cylinder of a portable hydrocarbon motor that have so far found application present many inconsistencies. On the one hand we find the limit of inventive genius all but reached in an effort to provide an enormous radiating surface with a minimum of bulk and weight; on the other we find an almost utter disregard of the na-

ture and efficiency of radiating surfaces. Again, particularly with air cooled motors, we frequently find ample radiating surface made ineffective through the use of material that is a poor conductor of heat—thus failing properly to distribute to the extremes of the radiating surface the heat which comes from the cylinder.

A hydrocarbon motor is cooled for four reasons—to guard against preignition; to prevent breakdown of the cylinder material; to keep the lubricant from decomposing; and to avoid reducing the volume of the incoming charge through expanding it by heat as it enters. Aside from these considerations, the hotter the motor can be run the more efficient will be its operation. Consequently, in cooling, we have only to dispose of a certain surplus of heat that otherwise would work injury in one of the ways just enumerated.

The first point in keeping a motor from becoming too hot is to have the cylinder made of so poor a conductor of heat that it will abstract the least heat possible from its contained gases. Iron and steel, which are commonly used for gas engine cylinders, fulfill this condition as well as can be expected. There is no material existing that, besides having so low a heat conductivity as iron and steel, could meet the other requirements of gas engine cylinder construction. The following table, which gives approximately the relative heat conductivity of various metals, shows this:

Metal.	Heat Conductivity.
Silver	100.0
Copper	73.6
Brass	23.1
Iron	11.9
Steel	11.6

Radiating members require qualities quite the opposite to those necessary in the cylinder proper, consequently it seems ill advised to make both of the same material, as is so often done. Just as the cylinder wall should be of low conductivity, to avoid taking up heat, so should the radiating members be good conductors of heat, to rapidly carry away that accumulated by the cylinder and to dissipate it throughout a large area of radiating surface.

There can certainly be no question but what a copper flange about a cylinder may be of greater diameter and surface, and still radiate heat from its outer edge, than would be possible with an iron flange on the same cylinder. Likewise, a silver flange would be better than one of copper, as it would have a still greater radiating surface, with the same capacity—due to its high heat conductivity—of rapidly distributing heat to the limits of its surface that was possessed by the smaller flange of the different material. The commercial application of silver is impracticable on account of the cost.

In view of the extreme methods that have been adopted to increase the area of radiating surfaces it is astonishing that so little has been done in the way of securing

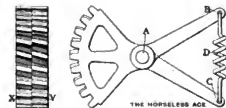


FIG. 3.

the highest efficiency of radiation from such surfaces. There seems to exist a popular misconception to the effect that radiation is determined by the material of the radiating surface, whereas the most elementary textbooks tell us that the radiation of heat from a given surface is chiefly dependent upon the finish and color of the surface. Yet we find most builders almost wholly indifferent to the character of the radiating surfaces they use. Thus we find plain—and even nickel plated (?!—iron, and bright, or at best, slightly tarnished copper surfaces, representing the regular practice of prominent manufacturers, despite the fact that such surfaces are nowhere near as effective as they might be. What such construction must result in can best be indicated by figures. The following are stated by a prominent authority as the relative radiating efficiencies of the surfaces given, through such a range of temperature as is commonly met with in correct gas engine practice:

Surface coated with lampblack.....	100.0
Tarnished lead.....	45.0
Polished silver.....	2.5

In other words, under given conditions, a radiator or radiating member coated with lampblack should throw off forty times as much heat as one constructed of polished silver, and over twice as much as one made of tarnished lead. Similar conditions, in varying measure, prevail throughout the whole range of available materials.

A simple test that should convince any manufacturer of radiators or automobiles, if figures and theories do not, could be carried out with two exactly similar vessels of polished or bright metal. Let one vessel be coated evenly with lampblack or any lustreless black paint. Then fill both vessels with boiling water and observe how much more quickly that in the black surfaced vessel becomes cool. The vessels should, of course, stand on wood or other material that is a poor conductor of heat, or they may be suspended by cords, but the result will not be affected even if an air blast is directed upon them, so long as they both are equally subjected to it. The same result will follow if two similar metal objects, one clean and highly finished and the other blackened as described, are heated to the same temperature and substituted for the vessels.

The points thus far brought forward hold equally true both of air cooling systems and of all water cooling systems that require the use of an air cooled radiator to keep the water cool. Indeed, it may be said that true water cooling only exists in stationary practice, where fresh water is constantly used, and in some automobiles that use up their cooling water very rapidly, thus cooling the motor by the refrigerating effect of evaporating water. With water cooled automobile engines of most approved design there is only a nominal replacement of water, and the engine is

virtually air cooled, the water serving merely as a medium to convey the heat from the engine to the radiating surfaces, and the system differing from those regularly termed air cooled more in detail than in principle of operation.

Despite the efficiency of cooling systems that circulate water between a radiator and the water jacket on the engine cylinder, there are many objections to this type. Complication, liability to freeze in cold weather, leakage and weight are chief among these.

The comparative success of several systems of air cooling should encourage the automobile world in a hope that this may yet prove the final type. In the meantime at least two means of rendering air cooling more efficient are in sight, but still await the enterprise of manufacturers for their application. The first is the use of better conductors of heat for radiating members; the second consists in giving more careful and scientific attention to the finish of radiating surfaces. This latter applies as well to water cooling systems as to those depending upon air alone.

Vehicle Suspension Springs.

(Abstract from a report to the Second International Automobile Congress by M. Pozzy.)

The problem of providing automobiles with the most perfect spring suspension possible requires the co-operation of the car manufacturer, the metallurgist and the

ment is subject to some variation. The arrangement of front springs is identical for vehicles driven by chains and by bevel gears. It consists of two semi-elliptics secured to the axle by clips, and fastened to the frame at one end by means of the spring horns, the end of which is developed in fork shape, and at the other end by means of links permitting the spring to extend freely. At the rear end of cars with chain drive, two semi-elliptics are secured to the frame by means of links, which permits a free extension of the springs and facilitates adjustment of the chains. In cars with bevel gear drive the springs are secured to the frame at one end directly, and at the other through the intermediary of links.

Some manufacturers, in an effort to increase the smooth riding qualities of their cars, place a transverse spring at the rear of the frame; others have adopted what are termed platform springs for suspending the rear part of cars with level gear drive, and the results have been very satisfactory.

As a special arrangement of springs the following may be mentioned: In front two semi-elliptic springs are secured at the forward end to the forked spring horn, and at the rear end to two quarter-elliptic springs placed in the direction of the vehicle, below the frame. This suspension is exceptionally resilient, and for that reason merits special mention.

Finally, attention should be called to the



THREE QUARTER ELLIPTIC SPRINGS IN FRONT.
TWO VIEWS OF A COACH SPRING REAR SUSPENSION.

spring manufacturer. The first determines the general arrangement of the springs, and calculates the loads they must support; the second furnishes materials of construction of suitable qualities, and the third from the steel supplied by the metallurgist constructs springs to satisfy the specifications of the car manufacturer.

ARRANGEMENT OF SUSPENSION SYSTEM.

During the early years of the automobile movement full elliptic springs were adopted to some extent, but were soon abandoned, for, although they provide a good suspension, they present a number of disadvantages. The two fastening points being at the centre of the spring, the axle is not held sufficiently secure, and is allowed to oscillate under the influence of road unevenness, which results in dislocation of the spring and consequent unsatisfactory spring action. Another disadvantage is that the body frame is raised too high above the ground.

At present the use of semi-elliptic springs is very general. Their form is always the same, but the method of attach-

system of front suspension, consisting of a single transverse spring secured to the frame in the axis thereof by means of a pivot joint in such a manner as to permit the axle to move freely in a vertical plane without reacting on the spring or frame. Mention should also be made of a point in spring suspension discovered by M. Feraud, engineer of the Eastern Railroad—that by reversing the inclination of the links—all other conditions remaining the same—the flexibility of the springs is considerably increased.

This brief consideration shows that methods of spring suspension are today well standardized, and that semi-elliptic springs for the front, and either semi-elliptic or platform springs for the rear, are the only forms which can be recommended to manufacturers.

However, though the car manufacturer does not now need to hesitate in deciding upon the method of suspension, he must be most careful in considering the conditions of good operation. The springs must be of great length, of moderate flexure, and

consist of numerous wide and thin leaves. Particular stress should be laid on the width of the leaves, and in most cases an increase in width would be very desirable. On the other hand, the user, whose mechanical knowledge increases day by day, will readily understand that it is impossible for the suspension to be as resilient when the car carries only one-half its complement of passengers as when it carries a full load; he should also appreciate that the springs have an elastic limit, and that they cannot well support the excessive overloads which are often placed upon them.

It may be said that much progress has been made during the last few years in improving the quality of spring steels, and at present it is possible to find steels satisfying every requirement and giving complete satisfaction.

SPRING STEELS.

As a rule, the steel employed for automobile springs is of the same quality as that specified by railroad companies for car springs. Such steel is produced by the Martin process from fine purified cast iron and selected morsels of iron and steel. The tensile strength of this steel varies between 100,000 and 120,000 pounds per square inch, with an elongation, in the natural state, of 16 to 20 per cent. After hardening and tempering, the tensile strength is from 170,000 to 180,000 pounds per square inch, the elongation 7 per cent, and the elastic limit 114,000 to 128,000 pounds per square inch. These test results which the "high grade" steels should give are very satisfactory, and offer every guarantee of safety.

There are, however, a number of extra steels in the market, such as silicon steel and tungsten steel, which are suitable for the manufacture of springs for special purposes, such as racing cars, for example. Silicon steel is generally manufactured in the Martin furnace by the same process as the so called "high grade" spring steel. After the steel has been completely melted and a metal of the desired hardness produced, silicon and manganese are added, which give the steel the desired qualities. It is then poured into ingots and worked up by the ordinary manufacturing processes. Silicon steel, when suitably treated, presents a fine fibrous texture and will withstand considerable deformation before breaking. The processes of its manufacture and treatment are kept secret by the manufacturers, and this secrecy is a sign of difficulties experienced in the working of the metal. Among these difficulties may be mentioned that of welding, as it happens that two pieces of the steel will not weld together, even at a high temperature. The result is that the ingots often contain blowholes, which lead to longitudinal lamination and other defects. There is no doubt, however, that metallurgists will in time overcome these defects, which are being minimized every day.

The tensile strength of silicon steel is from 114,000 to 128,000 pounds per square inch of cross section, with an elongation

of 12 per cent. After hardening and tempering, the tensile strength varies between 200,000 and 215,000 pounds per square inch; the elastic elongation by direct pull is .7 to .8 per cent., and that by bending between .8 and .9 per cent.

Tungsten steel as used in the manufacture of automobile springs is manufactured in the Siemens crucible furnace, and the materials entering into the manufacture of this steel are of the very highest grade. They are obtained by treating very fine cast iron derived from the best ores, which are puddled and are then picked out to remove from the crucible all those particles which are not of the very highest quality.

Wolfram steel is of uniform composition, and is made with the greatest possible care. The materials of each charge are carefully weighed, and melted in a closed crucible. After fusion the steel is poured into ingots of nearly square cross section, and the ingot thus obtained is heated in a special furnace to undergo a puddling operation at high temperature. This puddling is effected by means of a piston, and serves the object of forcing the molecules of the metal into closer contact and to remove any superficial defects which may exist. This operation having been completed, the ordinary process for obtaining steel in bars is continued. When Wolfram steel is raised to a temperature of 850° Cent. and hardened in water at ordinary temperature (18° to 20° Cent.), it presents a very fine, shiny and silky texture. When hardened in this manner and tempered to 600° Cent. the metal becomes very fibrous and fracture is followed by chipping off small pieces. The tensile strength of the metal in the natural state is from 114,000 to 128,000 pounds per square inch, with an elongation of 15 per cent. After hardening and tempering, the elongation for bending stresses is still 9 per cent. for a tensile strength of 214,000 pounds. If, finally, we compare the elastic limit to the breaking strength for bending stresses, we have in the first case 214,000 pounds and in the second 384,000 pounds. This result is interesting, because it is desirable to have the elastic limit and the point of rupture as far apart as possible. Wolfram steel is tenacious and flexible, which obviates all danger of fracture and deterioration. Its long use by a number of railroad companies has developed the fact that with it there is less trouble than with any other spring material.

CALCULATION OF SPRINGS.

The calculation of leaf springs is very complicated. The subject was first treated by Mr. Phillips, and his formulae are still used, but in general each manufacturer uses his own empirical formulae, which, in conjunction with his experience and his daily trials, give results of sufficient accuracy.

For passenger cars the flexures generally allowed are as follows:

In Light Cars—Front springs, .4 to .45

inch per 100 pounds; rear springs, .45 to .5 inch per 100 pounds.

Heavy Vehicles—Front springs, .36 to .4 inch per 100 pounds; rear springs, .45 to .48 inch per 100 pounds.

Commercial Goods Vehicles—Front springs, .18 to .2 inch per 100 pounds; rear springs, .18 to .2 inch per 100 pounds.

As to the number of leaves, every effort is made to increase it as much as possible by diminishing the thickness of the leaves. The number is, moreover, a function of the quality of the steel employed; because, if it is admitted that to give good service the spring must support one-half the test load, the high grade steel would work a .3 per cent. elongation, while the special steels—silicon and tungsten—would work at .4 per cent. elongation without any trouble. Consequently, with equal load, a spring of silicon or tungsten steel is very much lighter. Experience has shown that the saving in weight by the use of these materials lies between 16 and 20 per cent.

But to obtain these results the manufacturer is obliged to take the utmost precaution in the hardening and tempering operations, which are different for each quality of steel. These special steels have in reality different textures and different properties for different temperatures of hardening and tempering. Consequently, long experience and very careful attention are required to insure satisfactory results. The same as in the manufacture of the steel, special methods are also required in working it, and for this reason the spring manufacturer frequently has to perform a difficult task. He must, on the one hand, follow the instructions of the car manufacturer, and is, on the other, dependent upon the metallurgist, for if there should have been any irregularities in the manufacture of the steel, much trouble may be encountered in the manufacture of the springs.

Interrupted Marttyrdom.

A young Englishman "of excellent family" and owner of an automobile was arrested recently for scorching, and the judge before whom his case was tried imposed a penalty of \$50 or two months' imprisonment. The young sportsman was so convinced of the injustice of the sentence that, although well to do, he preferred to accept prison confinement to paying the fine. Two days' sojourn behind the bars proved enough for him, however, and he then expressed willingness to pay the fine. Upon his release he made the rather naive statement that if automobilists had any conception of what prison life really meant they would never have acceded to a law imposing a penalty of imprisonment for speed excesses.

Betriebssicherheitswettbewerb is the German for endurance contest; the French say épreuve d'endurance and the English reliability trials.

LESSONS OF THE ROAD

The Summerytown and Spring House Pike.

By DANIEL LONGAKER, M. D.

On returning from a 75 mile trip recently we went miles out of our way to reach a turnpike of whose excellence we had learned from a friend a few weeks before. Our detour took us over very rough and hilly roads, with many sharp ascents and descents, down to the Perkiomen and over it, past the home of our Governor Pennypacker, and finally to the Spring House and Summerytown Pike.

Nothing could have been more delightful than the change from the worst possible roads—roads over which no auto could make 10 miles an hour with safety—to the best we had ever traveled on. We found ourselves on a perfect highway, its smooth, dustless surface suggesting sandpapering. Our little (popular runabout) wagon fairly ran away with its load of four—two children and two adults.

But tollgates soon loomed up. We found seven in a distance of 15 miles. Full of good humor I addressed the first three keepers in succession in the vernacular, informing them ours was a one horse wagon only, and demanding the price for such. The reply was "zwae zent" at the first, "drei zent" at the second and third. At the fourth gate we began to fare badly, and the keeper, a gruff old fellow of fifty, saw no humor in my dialect. When I failed to grasp his "dreizehn" he repeated, in English, "The price is 25 cents both ways; one way you can go for 13 cents"! Demanding how far the 13 cents would allow us to travel he informed us to the next gate, 2 miles away; there the same price would be due, and we would have to pass four gates. This made 60 cents for the privilege of driving 15 miles! To us this charge was something like a hold-up.

At North Wales we bought 2 gallons of gasoline, and incidentally gained some information in regard to the origin of this extortionate toll rate. At a meeting two weeks before the directors concluded that since the law placed no limit on the charge for toll for automobiles, in fact did not mention them, they could charge as much as they pleased, and they fixed the price at 25 cents a round trip at each gate.

The alleged reason for this remarkable action was that the automobiles were driving horse drawn teams off the road! Our informant continued: "There are several automobiles in town here, but the owners know how to skip around the gates pretty well!"

At Spring House we turned to the Bethlehem pike, and here we paid 24 cents for an 8 mile ride toward the city. Altogether

it costs 84 cents in toll for driving an 880 pound rubber tired runabout 23 miles.

The experience was rather unpleasant, and I am inclined to the view that for the present this route will not be a popular one with automobilists. On the entire trip down we saw not a single one, although it was a holiday—Labor Day. For the present we shall avoid this road and choose the rougher one, because it is free.

Of the many horses we met two only gave evidence of non-acquaintance with automobiles. The first one was a thoroughbred in an out of the way road, ridden by a gentleman. The beast showed evidence of an unusual degree of fright as we appeared in the distance. We went slower and slower, and just as the animal was about to turn we stopped, engine and all. Stepping out into the road, we were able to make the horse pass us. This was repeated several times, to the mutual satisfaction of all concerned. There was not a trace of bad feeling and no accident.

The second encounter occurred on the ideal highway in question. The beast was an ordinary plow horse driven by a farmer, who, with his woman companion, got out long before the horse saw us and when we were still about a half mile away. Seeing that the man was greatly scared, the woman less and the horse least, we slowed down and stopped and allowed the horseman to lead his horse past us. He looked devoutly thankful at so lucky an escape and ventured the information that it was the first automobile his horse had seen.

On the Bethlehem pike we saw signposted in large letters warning automobilists not to drive their machines faster than 10 miles an hour, and demanding that they stop engine and all on meeting horses which gave evidence of fright. The latter we had done because we found pleasure in doing it—not because we were commanded. The former regulation we violated and daily do so, because it is senseless. An ordinary man can walk 5 miles an hour, and to limit our speed to 10!

Powerful interests are doubtless affected by the invasion of the automobile, and the action here detailed is perhaps natural. Although the directors may not want us now, they surely will want us in the future. So far as our party is concerned we shall leave the horsemen and these particular turnpike men in undisputed possession of their fine road for the present, with but a single regret—that they are unfamiliar with our superior driving outfit, as superior to theirs as the Pullman coach is to the old stage coach of our grandfathers. The general public is with us and against the turnpike directors—the representatives of special privileges. A daily evidence is the eagerly interested crowd that every little runabout attracts as it stops or goes in city or country, an interest far greater than that displayed toward a coach and four-in-hand. What is the reason of this unwaning, nay, increasing interest? What is the secret? Is it not the dawning knowl-

edge of the ordinary man that here is a carriage—here is something he can and soon will have—that will enormously enhance alike his usefulness and his happiness? May it soon drive all the horses off the Summerytown Pike and likewise the tollgates, their keepers and all the other remaining vestiges of past ages!

Through Central New York State.

By D. T. G.

Having an opportunity to sell my motorcar if I would deliver it at Kingston, N. Y., I, with little daughter Dorothy, had planned to leave Binghamton on a Tuesday morning at 8 o'clock, but before 7 a terrific thunderstorm came up, which delayed our departure until after 10.

Leaving by the way of Chenango street we ran in thin mud for several miles. Owing to a new State road being under construction on the old Chenango canal road it was necessary to cross the hill into Port Crane. As this hill road is very steep, the rains had not softened the surface much and fairly good time could be made. On the down side it is very steep, crosses the railroad and makes a very dangerous turn, it being impossible to see a train coming from either direction.

From Port Crane to Sanitaria Springs the road is fairly good, with rolling surface. Two miles beyond Sanitaria is Belden Hill, a long, hard grade, followed by the river road, which, under ordinary conditions, is a fine country road, but which at this time, owing to the rains, had a very treacherous surface, and constant care was necessary to keep the car from skidding off the road.

Two miles from Belden brought us to Harpersville, where we learned that Mr. S., of Brooklyn, had met with an accident the day before by skidding into a potato patch, bending the front axle of his touring car badly and wrecking the radiator.

Two miles further on we came to Nineveh, and 5 miles further to Afton, where we stopped for dinner. While in the dining room it became very dark, with every prospect of another severe thunderstorm, and soon it broke with all its fury. The wind bent the trees to the ground, the lightning was almost constant, and the rain came down in torrents. The storm lasted about three hours. A gentleman of Binghamton started out in his touring car just before the storm, and where he landed or what happened to him I don't know.

There are two roads out of Afton, the principal one being on the same side of the river, but it is badly cut up with the milk wagons which carry several tons and use narrow tires. If New York State, instead of spending vast sums of money in building segregated pieces of road in out of the way places, would build trunk lines from one city to another and arrange for their being kept in repair, at the same time compelling the use of wide tires on all wagons, the good roads question would soon settle itself; but where heavy loads are

carried on tires not over 1 or 1½ inches wide, any road surface, be it clay, gravel or macadam, will naturally deteriorate very rapidly.

We decided to cross the river at Afton and found we had made a good choice. There had been very little travel and therefore the roads were not cut up, although flooded with water in many places. Running through them the hot muffler would drag and we would be enveloped in a cloud of steam. The first time this happened it was very startling, and we saw in imagination the yellow sheets coming out with big headlines—"Another Automobile Exploded."

The 10 miles to Sidney was covered in three hours, and when we finally landed at the hotel we were informed that it would be impossible to get on to Unadilla, as the road was impassable and were advised by the local oracle to stay there overnight, let the roads dry off a little and go on in the morning; but, knowing by experience that clay is much worse to travel over when partly dry, we decided to try and go on, and took the north road, again crossing the river. It was slow traveling, as the rear wheels would spin and the car stand still until the friction of the tire on the road would dry it off enough to give traction. This was particularly bad on grades. A few miles out of Sidney we ran onto the track of another automobile, and, as we could run in one of the tracks, got along a little better. A gentle rain now commenced, but, having "got wise" and put on our rain coats and blankets, we were fairly comfortable.

Pounding away on the low gear, at not over 3 miles per hour, we saw something ahead of us and as we got nearer found an acquaintance, Dr. W—, of Binghamton, lying on his back in the mud under his raincoat with a broken chain and no compression, and using language that would not be suitable for publication.

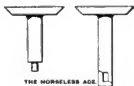
We stopped and offered him our assistance, but he said he wanted nothing except to get fixed up as soon as possible and get on to Onconeta, 22 miles away. As it was getting dark and we could not be of service to him, we started up again on our now wearisome ride to Unadilla, 3 miles away, where we arrived at 9 o'clock, having been about seven hours in going 40 miles. We stayed over night at the Unadilla House. At this hotel autos are taken care of without charge.

On arising the next morning we learned that the rain had continued all night, the sky was still a leaden blanket and it appeared as though it might continue to rain all day, but we decided to try to run to Franklyn, 9 miles, and after filling up our water and gasoline tanks made a start. All the town croakers were there, telling us different routes and showering us with advice, which was carefully filed away for future use. To avoid the mud in the town we crossed the river at the lower bridge.

For a mile we had a good hill road and then our trouble began. The roads had been cut up with the narrow tires and it was necessary to travel on the low gear. About this time I noticed a decided odor from the machine, and on getting out detected a slight leak of blue haze from the crank shaft, which I attributed to a leaky piston—probably a broken ring—although I never have had an opportunity to verify this hypothesis. Another proof seemed to be in a little loss of power in the motor (a 3½ horse power De Dion).

After traveling one hour we stopped and asked how much further it was to Franklyn, and learned that we had run as yet only 2 miles. We finally reached Franklyn, however, at 11 o'clock. Not wanting to wait there for dinner, we started on, thinking we could dine at Treadwell or Croton. Upon arriving we found there was no hotel, but the village doctor's wife took pity on us and gave us a fine meal.

Coming out of the house we found sixteen horses around the machine, with their owners endeavoring to educate them to it. This locality was the only one I have ever seen in which the total populace was favorable to the auto and conceded it a right to half the road. My experience in touring



ing has been that the rural districts are much more favorable to the machine than the bulk of the drivers in the cities and larger towns. All through this section great interest was manifested in the coming endurance contest, and many horse owners expressed the intention of training their horses at that time.

From here to Delhi we found roads somewhat better, although the high gear could be used but little. Delhi is a charming village situated between high hills and cannot be seen until you are almost in the town. The hill leading into it, which the endurance people must climb, must be close to 3 miles long. It is not particularly steep, but tedious and rough in places.

Here we filled with gasoline and water and started for Andes, 12 miles, where we proposed to stop for the night, and from here on was the worst part of the trip. Here again we found the deep runs of the milk wagons, and even on the low gear could scarcely stay on the seat. A few miles out we came to a toll gate. On stopping and asking "How much?" we were informed "Nothing, only horses are charged for." This was quite different from a toll bridge between Binghamton and Elmira, at which a schedule of prices prevailed, ranging from 25 cents for a single horse and carriage to \$1 for a traction engine. The woman in charge of the bridge

said that she didn't know how to classify an auto except as a traction engine, and therefore must charge the price for it.

In making up the parts to carry on this trip I neglected to add an inlet valve and feared on the whole trip that the inlet valve might give out, as it had seen several thousand miles' use, and, sure enough, half way between Delhi and Andes the motor stopped, and on investigation I found that the stem was broken in the slot, at the bottom of the slot on one side and at the top of the slot on the other side.

It looked like a hopeless case, but I proceeded to see what could be done to wire it on with copper wire, but it would work for only a few minutes. This method I tried a few times with some variations, but finally gave it up and tried iron wire, with no better results. The valve, looked at from another quarter, gave the appearance shown on left. I filed out a groove, as shown by dotted lines, and found a small cotter pin, which I fitted around it. On starting up I found that it held perfectly, and saw me into Andes.

After supper I hunted up a jeweler, and, after filing off the upper part, drilled and tapped into the stem in a longitudinal line and put in a screw with washer, which is working perfectly yet.

At Andes we learned that Mr. Unwin, on his second trip over the endurance route, broke the low gear of his car and was held up for three days.

The next morning bright and early we left Andes. About a mile out of town we commenced to climb the long Palmer hill, at the top of which I noticed that the right front tire was down (from puncture by a horseshoe nail). I got out the repair outfit and had about completed the repair when I heard a horn, and coming up the hill was a touring car occupied by Mr. and Mrs. S.

After pumping up the tire we traveled down the hill and at the bottom found Mr. S's car stopped, owing to a broken inlet valve casing. It was finally secured with iron wire and held without further trouble into Kingston.

When we started again we discovered that the front tire which we had repaired was again soft, so pumped it up, thinking to reach Arkville for dinner and there put in a new tube. The county fair was being held at Margaretville and we were obliged to make constant stops for horses. This locality is a favorite one with summer boarders and almost every barn is a livery. The boarders have about as much knowledge of handling a horse as the average school boy has of the sacred books of the East, and many amusing things were witnessed. At Arkville we pulled up at the hotel for dinner, and as we got out remarked to the hotel clerk that they had some horrible roads in this section. "Yes," he replied, "and they ought to be ——— worse for those things." It seemed to us that the

patronage of auto tourists should be placed elsewhere, and we were about to go on, when the proprietor of the hotel, who had heard the conversation, came out and, patting me on the back, said: "You mustn't mind that fellow; he is a little drunk," and then proceeded to make everything as pleasant as possible for us.

After we had finished a good dinner we discovered that there were four nails in our front tire. Mr. S. said he would repair it in a few minutes, and the way in which he proceeded to take off the cover was a revelation to me. At this time he put me onto a little wrinkle which is well worth knowing: After an inner tube has been taken out the inside of the cover should be felt for nails or tacks. In this tire we found one which was undoubtedly the cause of our slow leak. Putting in a new tube, we were soon under way and making the long climb up Pine Hill. The other car, having an intermediate gear, soon distanced the motor-ette.

After we had reached the summit and feasted our eyes on the beautiful panorama, we started down the other side to Heisemann's, and when half way down the hill were stopped by two boys, who said: "One of them big automobiles scart a horse on the hill and he run away and threw 'em out, and one of 'em's going to die, and he gave me a quarter to pull the wagon down to the barn." On reaching the town at the foot of the hill we found everybody out on the street in a state of great excitement, and as I was obliged to stop for gasoline I was soon surrounded by a mob, asking questions about the other automobile, of which, of course, I knew nothing. Soon Mr. S. appeared coming back, and said he thought perhaps I might get into trouble and he came back to see me out. I then learned the truth of the accident, which was that these drivers (?) when they saw the automobile, which was off to one side of the road with motor stopped, turned their horse around, hit him with the whip and then jumped out, and the horse ran on down the hill, doing comparatively little damage.

The owner of the rig and the two drivers then captured Mr. S. and tried to bluff him into paying for it, but the old boy had his nerve with him and refused to pay the \$30 they demanded, or 30 cents or any other sum. A gentleman came up and informed me that the day before these same two men had one of his horses which they let run away and break the wagon, and very kindly gave his name and address if we should need it in the future. The next move of these men was to try to get a "warrant of arrest" from the justice of the peace, who very properly refused to grant it and said this matter was one for a civil suit only and that no one had the right to stop us from going on.

So we started up the machines and were soon on a fine piece of macadam road clear to Phenicia, and what a pleasure it was after our hard roads! One very amusing incident happened when we were met by a

young Hebrew driving a large rawboned gray horse. He had the fright of his life, dropped the reins, and standing up waved both hands frantically, yelling at the top of his voice to stop. Jumping out and grasping the horse by the bit he screamed loudly for help. By this time the old cob had waked up to the fact that there was something to be alarmed at, and with the driver hollering "Back! back! whoa! Please whoa! Please don't run away!" commenced to rear and plunge. I put a blanket over his head to lead him by (something that works nicely at times), but the old nag didn't propose to stand for this sort of thing at all, and stood up on his hind legs and gesticulated wildly. He had partly turned around in the road, so we headed him in the same direction we were going and the very amateurish driver got in and drove (or rather rode) up to a barn and had the horse stick his head in a door where he could not see us go by. As we passed we gave him a parting shout: "Whoa! Good horsey, please whoa!" at which he shook his fist and gave a look which, if directed at the tire, would certainly have punctured it.

After leaving the macadam we found very good roads to within 14 miles of Kingston and then, getting on to the Stony Hollow road, the worst I have ever seen. This road, if road it can be called, had been paved for the purpose of drawing quarry stone. Imagine, if you can, a road in which flat sidewalk stones about 2x3 feet had been dumped (dumped, not laid) in such a way that a full truck wagon could travel on them. Use this for twenty years without repairs, carrying loads requiring six and eight horses, and you have a fair conception of what this road is. For the 14 miles it is a decided down grade, which made it necessary to use a brake most of the way, and we were thankful when we struck Kingston, even if it was a cobblestone pavement.

Inquiring our way we soon arrived at the Eagle Hotel. We put our machines in the barn and our eventual trip of less than 200 miles over the worst kind of roads, taking three full days, was over.

Dr. Lyman's Plunge Into the Erie Canal.

As has already been reported in *The Horseless Age*, Dr. John Grant Lyman, of New York city, on September 13 drove his high powered foreign touring car through an open bridge on Genesee street, Syracuse, into the Erie Canal. The illustration herewith, for which we have to thank C. F. Garfield, of Rochester, N. Y., shows the machine being hauled out of the canal after the accident. Dr. Lyman was on a trip to the races and was accompanied by Armand W. Brand and W. T. Rynard, both of New York, and his chauffeur, A. Dietz.

At the approach to the Erie Canal the view is somewhat obstructed by the New York Central Railroad bridge over the street, and for this reason Dr. Lyman, who was driving, did not notice that the bridge



DR. LYMAN'S MACHINE RESCUED FROM ERIE CANAL.

was up in midair. The car was going at a lively pace and when the summit had been reached and the bridge was noticed to be open the distance was too short to stop in. Brand jumped out and broke his ankle and the three other occupants plunged with the car into the canal. All three were good swimmers and soon reached the bank. The car was afterward hauled out, as shown in our illustration.

An Interview With Mr. Shattuck.

Albert R. Shattuck, president of the Automobile Club of America, returned to New York city on September 15, after an extended trip abroad, in the course of which he devoted six weeks to a 4,000 mile automobile tour through Switzerland and the south of France, accompanied by his wife and her mother.

In an interview with a representative of *THE HORSELESS AGE* Mr. Shattuck reports that he found excellent roads and met with no more serious mishap than running over a dog.

Trade conditions in France, according to Mr. Shattuck, have resulted in lower prices for automobiles put out by the less prominent or less reputable makers, but the better known makes still come high. The De Dion and the Peugeot companies are still the only concerns that are paying any attention to the demand for light, low priced machines. On touring cars, canopy tops with a glass enclosed rear are rapidly becoming universal on account of the dust protection they afford.

Mr. Shattuck speaks in emphatic condemnation of the Paris-Madrid race, characterizing it as a "reckless affair," and declaring that during the actual race automobiles, bicycles and horse drawn vehicles were frequently in the way of the contestants. He thinks that there will be no more road racing in France for a number of years.

It is pretty well settled that the Gordon Bennett race for 1904 will be held in the vicinity of Homburg, a town near Frankfurt, Germany. The German Emperor is said to have expressed his approval of this locality for the event.

NEW VEHICLES AND PARTS.

The Ford Gasoline Car.

Several new Ford automobiles manufactured by the Ford Motor Company, of Detroit, Mich., have recently been received by

valve stems are carried into the lower portion of the crank case, where they are all operated by four cams on a single half motion shaft. The gears that operate the cam shaft are both enclosed in the crank case and are thus lubricated without attention. A Kingston carburetor with a pedal con-

sure on the oil is created each time the cylinders approach each other. This pressure forces the oil to flow through four siphon tubes, which open into the bottom of the reservoir but rise above the top of the oil, to four sight feeds mounted in pairs on the top of the reservoir, from which the oil is led by tubes to the two cylinders and the two shaft bearings. When the engine is not running there is no pressure in the reservoir and the oil cannot flow out on account of the height of the bends in the siphons.

Cooling is effected by a radiator built of sixteen flanged tubes placed horizontally across and parallel to the front of the vehicle, and arranged four high and four deep. The tubes are connected in pairs by depressions in the solid end mountings in which they are set. Circulation is by a centrifugal pump direct connected to the main shaft of the engine. The water tank holds 6 gallons.

Planetary transmission is employed, the engine shaft being parallel to the rear axle. Two speeds ahead are controlled by a lever; the reverse is by pedal. The drive is direct on the high speed. A Whitney roller chain is used, and the differential is of the well known spur gear pattern.

The frame is of angle iron, and both front and rear springs are full elliptic. The distance rods are without adjustment, the rear axle being moved forward or back in four slots in the spring blocks to loosen or tighten the chain. The axles are tubular. An additional spring—a half elliptic crosswise of the rear axle—is supplied with tonneau equipments. The wheels are 28 inch, of the wood artillery pattern, twelve spoke front and rear, and run on Hyatt roller bearings. Tires are 3 inch Fisk single tube.

Wheel steering, direct connected and reversible, is used. The brake operates on the drum of the differential.

The body can be entirely removed from the chassis simply by loosening six bolts. Mud guards are metal, flared in front.

The wheel base is 6 feet and the tread 33 inches, and the speed ranges up to 30 miles an hour.

Motor Battery Wagon.

A motor battery wagon has just been completed for the United States Government by the United States Long Distance Automobile Company, Jersey City, N. J., and will be given a practical test in the army manoeuvres at Fort Riley next month.

The vehicle is to serve as a general utility wagon for the craftsmen whose duty it is to maintain and repair the various equipments of an army. To this end the machine consists of a strongly built truck, weighing about 6,000 pounds, and carrying a boxlike body in which are stored carpenter's, saddlers', machinists', farriers', blacksmiths', harness makers' and gunners' tools and supplies, to a total weight of 4,445 pounds more. The box, which is



THE FORD CAR.

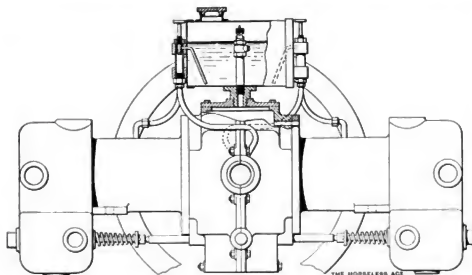
C. A. Duerr & Co., the New York agents. These machines are the first of their kind to appear in New York city.

The vehicle is light—about 1,000 pounds—and is of the runabout type, although a detachable tonneau is supplied if desired.

The engine is two cylinder, of the horizontal opposed type, and is said to run at from something over 100 to 1,000 revolutions per minute, developing 8 horse power. At the highest speed it is remarkably free from vibration and noise. The cylinders—4 inch bore and 4 inch stroke—are cast of hard gray iron with water jackets and heads integral. The exhaust and inlet valves are horizontal and are arranged parallel in pairs beneath the cylinders. The

nection to the throttle supplies mixture to both cylinders. The gasoline tank holds 5 gallons. Ignition is by jump spark and current is supplied from two sets of batteries, each composed of six dry cells—one set being held in reserve. A lever on the steering post advances or retards the spark.

Oiling of the cylinders and main shaft journals is effected by an ingenious arrangement which is entirely automatic in its action, it being sufficient to start and stop the engine to bring the lubricating system in or out of play. On top of the crank case, a 3 pint oil reservoir is mounted. From above the level of the oil in this reservoir a tube leads down to the crank chamber. Thus, when the engine is running, a pres-



LUBRICATING SYSTEM OF FORD ENGINE.

THE HORSELESS AGE

strengthened by an angle iron frame and painted in the regulation Khaki, is divided into fourteen compartments, closed by doors hinged from the top in such a manner that when raised the larger ones form hoods to protect the workmen from the weather. A small engine lathe, driven by a 5 horse power Holley engine, is carried in a side compartment, and when in use is drawn forth into convenient position. The motor which drives the lathe also drives a one-half kilowatt Lundell dynamo, supplying eight 16 candle power lamps, that can be used either for lighting the vehicle or for general illumination. Two storage cells supply current for the lights and for ignition purposes when the dynamo is not running. A portable forge, an anvil, emery wheel, 12 inch grindstone, two extra 56 inch wheels for gun carriages, six wagon poles, picks and shovels, lifting jacks, lanterns, soap, oil, spare neck yokes, singletrees, doubletrees, etc., are also carried.

The truck is propelled by a four cylinder engine, developing 24 horse power actual, and running normally at from 300 to 800 revolutions per minute, although it can be speeded still higher. The cylinders are cast in pairs, with integral heads and water jackets. All valves, the exhaust on one side and the inlet on opposite, are mechanically operated by twin cam shafts, similarly geared to the main shaft in front. The cam shafts can readily be removed without taking down the engine. All oiling is by individual pipes to each bearing. The feed is effected by diverting a fraction of the exhaust pressure into the oiling system. A multi-tubular radiator, 21½x28¾ inches, serves both as water tank and cooling device. The tubes, 2.800 in number, are three-eighths of an inch in diameter. Water circulation is by a centrifugal pump, and the air circulation is effected by a fan in front of the radiator, blowing air through it. The bottom of the crank case is divided into two sections, and either can be removed—to reach the cranks of either pair of cylinders—without disturbing the other or any part of the engine or vehicle. Jump spark ignition is employed, and automatic timing, not capable of variation by hand, is used. The storage battery is directly connected to the primary of the single coil, and the secondary is then commutated to the four plugs. This method uses more current than systems in which the secondary is interrupted, but is said to be more reliable.

The change gear is of the sliding type, with no direct drive, and gives four speeds ahead and one reverse. At 800 revolutions per minute of the engine the high gear gives a speed of 10 miles an hour. All speeds ahead are operated with one lever—the reverse with a separate lever. An interlocking device prevents speed changing without releasing the clutch.

The clutch is of the external band type, with copper blocks bearing on a steel rim. Chain drive is used, the chains being Whit-

ney roller, three-quarter inch wide and of 1½ inches pitch, and having a breaking strength of 30,000 pounds. Heavy bronze gear casings, absolutely oil tight, are provided.

Besides a brake on the transmission shaft, operated by depressing the clutch pedal below the release position, powerful expanding drum emergency brakes are fitted to the rear wheels.

The frame of the vehicle is of 5x1¾ inches channel steel, and the springs are half elliptic all around, those in the rear being slidably mounted against double steel blocks with a rubber cushion between. The front springs are two, mounted crosswise of the vehicle on either side of the forward axle.

Steering is by a wheel mounted in a vertical pillar and connected with the steering links by a worm and segment. A small wheel immediately above the steering wheel operates the emergency brake.

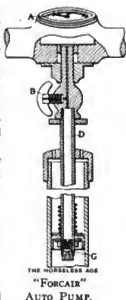
The wheels are 48 inches in front and 56 inches in the rear, of the wood artillery pattern, and with sixteen and eighteen spokes respectively. Firestone 5 inch, side wire tires are used.

Across the front of the vehicle is fitted a winch with two drums, geared to the main engine shaft through a 24 to 1 worm gear reduction. By the use of this it is expected that it will be possible to run the machine where no other means could take it. The winch is also expected to be useful in placing artillery.

The wheel base is 110 inches, the tread 60 inches, height over all 7 feet 7½ inches, and length over all 15 feet. Eighty gallons of gasoline, sufficient for a 300 mile run, are carried.

pany, of Kenosha, Wis., and is illustrated herewith. Gauge pumps have been made before, but the gauge has always been placed at the bottom of the cylinder, where it is difficult to read while operating the pump. In this device the gauge is placed in the handle, where it may be conveniently observed at any time. The metal parts of the pump are all made of brass, and are designed for hard usage. It is claimed that with this pump tires can be inflated to 120 pounds pressure in one minute.

The principle of the pump is the same as that of the ordinary bicycle pump, the plunger serving also as a valve. The hollow plunger D and the relief valve B make an airtight connection with the gauge A through the handle. A check valve G is placed in the bottom, surmounted by the cup washer. The relief valve B is airtight when closed and allows the air confined in the gauge to escape when opened. When the tire becomes inflated to the point of registration additional air forced into it will naturally force itself into the gauge under equal pressure, both check valves being of the same capacity.



The "Forcair" Auto Pump.

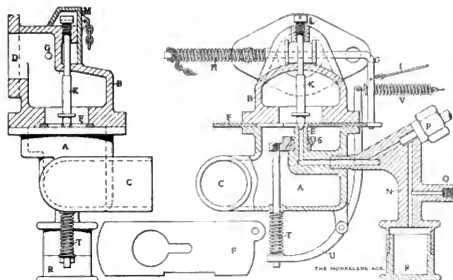
A combined hand tire pump and pressure gauge have been placed upon the market by the Frost Manufacturing Com-

The Oldsmobile Carburetor.

The 1903 Oldsmobile carburetor differs considerably from the previous year's model, not requiring any priming by means of a hand pump when the engine



MOTOR BATTERY WAGON FOR UNITED STATES ARMY.



THE OLDSMOBILE CARBURETOR.

is to be started and avoiding the use of the diaphragm pump for feeding gasoline. It is, generally speaking, of the mixer valve type. Several views of the apparatus are shown in the illustration herewith.

The body of the carburetor consists of a lower part A and an upper part B, secured together by means of a flanged joint. The air intake is shown at C, near the lower end of the part A. The air thus enters the carburetor near the bottom, passes upward through the body of the carburetor and leaves for the cylinder at the opening D in the casting B. A spraying nozzle E is cast integral with the part A. A slot is planed into the joint surface of the casting B to receive the plate F, which acts as a sliding throttle valve. This plate is shown separately in the illustration, and it will be seen that it is provided with a circular opening (of seven-eighths inch diameter) and a narrow slot extending from the circular opening in the direction of the length of the plate. The plate is arranged so its lower face is just on a level with the upper edge of the spraying nozzle.

Into a lug on the plate F outside the valve body is secured a steel rod G, bent in angle form, the longer arm passing through the walls of the casting B. The outer end of this arm is surrounded by a coiled spring H, which normally holds the sliding plate F (throttle) in such a position that the passage between the upper and lower compartments of the carburetor is nearly closed, the opening being reduced to such an extent that just enough mixture passes to enable the motor to run without load. The rod G is connected by a wire I to a pedal projecting in front of the driver from the footboard, and by depressing this pedal the driver can open the throttle and thereby speed up the engine to any desired extent.

The spraying nozzle E is normally closed by a needle valve K. The stem of this valve is provided with a circular flange a short distance above the throttle plate, and the current of air during the suction stroke of the engine acts upon this flange and lifts the needle valve K. The amount of lift of the needle valve K is limited by

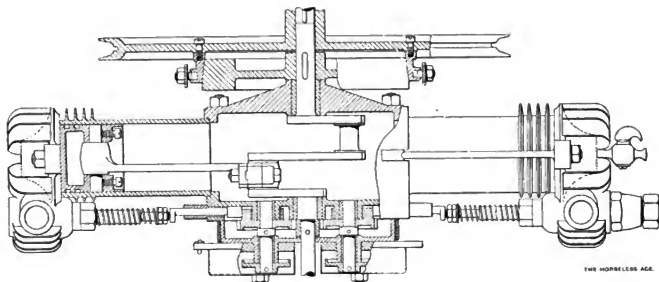
a stop screw L, which is set once for all by the manufacturers, and needs no attention from the user. The upper end of the needle valve K and the screw L are enclosed in a cap M.

Into the side wall of the casting A is screwed a casting N, through which the gasoline is fed into the carburetor. The gasoline arrives from the tank at O, and the feed is controlled by the needle valve P. At the bottom of this casting N is secured a well R, into which any solid matter that may be contained in the gasoline is intended to settle. The well is in the form of a hollow plug, and can readily be unscrewed and cleaned out.

Provisions are made for enabling the operator to increase the suction around the spray nozzle, and consequently the spraying or pulverizing action. These means consist in a collar S around the nozzle E, through which a number of holes are drilled at a slight angle with the vertical, so as to direct any air jets passing up through these holes directly against the jet of gasoline. Normally the collar rests in its lowest position, as shown, being held there by the coiled spring T. By means of the lever U the operator, by pulling on the outer end of the spring V, may, however, raise the collar S to the top level of the nozzle E, when nearly all the air is forced to pass through the holes in the collar, thus insuring very thorough spraying of the charge of gasoline. This arrangement is useful in starting the engine, particularly in cold weather.

Walters Light Gasoline Motor.

The cut herewith shows a plane view, partly in section, of a 2 horse power double opposed cylinder engine built by the Walters Power Company, of 66 Van Winkle avenue, Jersey City, N. J., for flying machine and other purposes demanding extremely light weight. The motor weighs about 24½ pounds without carburetor, and with carburetor it is said to come just



WALTERS GASOLINE MOTOR.

THE HORSELESS AGE.

within the 26 pound limit which was specified by the party for whom the design was gotten up. The engine is symmetrical on both sides of the crank shaft, and the two cylinders are concentric with each other. The latter are air cooled, of course, but only the heads and the outer portions of the cylinders are provided with ribs, the remaining length of the cylinders being smooth. The cylinders are clamped between the crank case and the heads by means of two anchor bolts each. Inlet and exhaust valves are in line with each other, only the latter being mechanically operated. The most interesting features of the design are the means employed to reduce weight to a minimum, and these seem to include cutting down bearing surfaces as much as possible.

The New Apple Ignition Dynamo.

We learn that V. G. Apple has redesigned his "62 B" dynamo, making it smaller and lighter without reducing the output—to volts and 4 amperes at 1,400 revolutions per minute. Among the improvements noted on the new Apple dynamo may be mentioned oilless bearings to prevent fouling of the commutator by oil or grease and a simpler brush holder, which will bring the cost of renewals of brushes to a minimum.

For use on cars which have the motor in front the Dayton Electrical Manufacturing Company is making an ornamental dynamo to be placed on the dashboard just over the flywheel of the engine, being connected with the flywheel by a 1 inch belt. This type of dynamo, like the "62 B," is also water, dirt and oil proof.

The Packard "Gray" Woff.

The new racer of the Packard Motor Car Company, which was illustrated in *THE HORSELESS AGE* of September 9, is the initial effort of this company to produce a vehicle purely for speed purposes. It is equipped with a standard four cylinder 25 horse power Model K engine, located under the bonnet in front. The machine is equipped with sliding gear transmission, giving two forward speeds and one reverse. On the high speed all gears are disengaged, and the drive is direct from the motor to the rear axle. The two forward speeds are equal to 30 and 75 miles per hour respectively, at an engine speed of 1,000 revolutions per minute. The makers claim that the car is not a freak machine, but contains all the elements of a road car. It is fitted with the same spring suspension as the Packard Model F, comprising a transverse front spring, providing a three point bearing for the body frame and great flexibility of the running gear, which admits of traversing uneven surfaces at high speed without disturbing the alignment of the mechanism.

In all the essential features, such as ignition, carburetor, cooling system, steering system and brakes, the car is similar to the standard Packard cars, differing

only in its shape, and in so far as all surplus weight has been eliminated. With supplies on board the machine tips the scales at slightly under 1,400 pounds.

Details of the Endurance Contest Route.

Advance proofs have been received from the N. A. A. M. of a very complete description of the route for the New York-Pittsburg Endurance Contest. The following are some points taken from this road description which may be of interest to automobilists who wish to follow the contest or to observe the passage of the vehicles at particularly difficult parts of the route.

The start will be made from the Point View Hotel, Weehawken, which may be reached from New York city by taking the Forty-second Street Ferry to Weehawken, turning left from the ferry, going about 500 feet, then turning right up an 8 per cent. grade about one-half mile. The steep up grades encountered, as given in this article, should prove favorable observation points for persons wishing to inform themselves of the hill climbing abilities of the competing cars.

GARAGES.

Monday, October 5, New York, New York Transportation Company, Forty-ninth street and Eighth avenue (No. 1). Tuesday, October 6, Pine Hill, N. Y., opposite Alpine Hotel, Main street (No. 2). Wednesday, October 7, Binghamton, N. Y., W. Whipple's garage, 221 to 225 Washington street (No. 3). Thursday, October 8, Bath, N. Y., fair grounds (No. 4). Friday, October 9, Buffalo, N. Y., Main and Good-ell streets (No. 5). Saturday, October 10, Erie, Pa., Tenth street, between Peach and Sassafras streets (No. 6). Monday, October 12, Cleveland, Ohio, White Sewing Machine Company's garage (No. 7). Tuesday, October 13, Youngstown, Ohio, city scale lot (No. 8). Wednesday, October 14, Pittsburg, Pa., Banker Brothers Company, Baum and Beatty streets (No. 9).

ASSOCIATION HEADQUARTERS.

Tuesday, October 6, Newburgh, N. Y., Palatine Hotel; Pine Hill, N. Y., Pinehill Hotel. Wednesday, October 7, Unadilla, N. Y., Hotel Bishop; Binghamton, N. Y., Hotel Bennett. Thursday, October 8, Elmira, N. Y., Rathbun Hotel; Bath, N. Y., Nichols House. Friday, October 9, Geneseo, N. Y., Big Tree Inn; Buffalo, N. Y., Hotel Iroquois. Saturday, October 10, Fredonia, N. Y., Columbia Hotel; Erie, Pa., Reed House. Monday, October 12, Geneva, Ohio, Tuttle House; Cleveland, Ohio, Hollenden Hotel. Tuesday, October 13, Warren, Ohio, —; Youngstown, Ohio, Tod House. Wednesday, October 14, New Brighton, Pa., —; Pittsburg, Pa., Schenley Hotel.

The route description gives a list of other

hotels at the night stops, with rates and facilities.

GASOLINE SUPPLY.

Gasoline may be found, in limited quantities, at any of the places shown in the description of the route. The association has arranged for sufficient supplies of gasoline at the following points, and has made arrangements for its sale in 5 gallon cans, to prevent delay in delivery and filling:

October 6, Newburgh, S. V. Cole, at Palatine Hotel; Pine Hill, W. Geroldseck & Co., at garage. 7th, Unadilla, S. D. Haight, at Bishop House; Binghamton, R. W. Whipple, at garage. 8th, Elmira Arms Company, at Rathbun House; Bath, Charles A. Ellas, at garage. 9th, Geneseo, Frazer, Green & Leasingham, at Big Tree Inn; Buffalo, at garage. 10th, Fredonia, W. E. Hayes & Co., at garage; Erie, W. E. Hayes & Co., at garage. 12th, Geneva, Haines & Kappan, at Tuttle House; Cleveland, at Garage. 13th, Warren, Packard Motor Car Company, at Square; Youngstown, at garage. 14th, New Brighton, Ross & Sager, opposite post office; Pittsburg, at garage.

HILLS TO BE CLIMBED.

The following appear from the road description to be the most difficult hills in the different daily routes. The figure in parenthesis denotes the maximum steepness. The distance in miles after the name of the town or near which the hill is located denotes the distance from the previous night stops and permits an approximate estimate of the time at which the cars will pass:

Tuesday, October 6, Hohokus, 18½ miles (15 per cent.); just beyond Allendale, 22 miles (13 per cent.); Orrs Mills, 53½ miles (long, 10 per cent.); 1 mile this side Marlboro, 67 miles (14 per cent., bad bumps); 1 mile beyond Marlboro, 68 miles (12 per cent., stony); 3 miles this side of Ulster Park, 83 miles (15 per cent.).

Wednesday, October 7—Pine Hill, start (long, 14 per cent.); Margaretville, 10 miles (10 per cent. and 5 per cent., with rather heavy sand); Palmer Hill, 19 miles (15 per cent.); 3 miles beyond Delhi, 38 miles (15 per cent.) Threadwell Post Office, formerly Croton, 44 miles (14 per cent., rocky); Alton, 78 miles (10 per cent.); Belden Hill, 3 miles from Sanatoria Springs, 90 miles (15 per cent., three-quarters mile long).

Thursday, October 8—Three miles beyond Union, 12 miles (15 per cent.); between Barton and Ellerstown, 30 miles (13 per cent., sandy and bad); 4 miles this side Bath, 100 miles (10 per cent., long).

Friday, October 9—Patches Mills, 24 miles (10 per cent., long); Craig Colony, 42 miles (12 per cent.); 1 mile this side of Avon, 60 miles (12 per cent.).

Saturday, October 10—Silver Creek, 35 miles (8 per cent., long); 4 miles beyond Ripley, Gulch Hill, 76 miles (15 per cent., winding).

Monday, October 12—One mile beyond Miles Grove, 17 miles (15 per cent.); East

Springfield, 20 miles (15 per cent.); Painesville, 72 miles (12½ per cent.).

Tuesday, October 13—Chagrin Falls, 20 miles (15 per cent.); Auburn Center, 28 miles (13 per cent.); Troy, 33 miles (13 per cent.).

Wednesday, October 14—Youngstown, start (16 per cent., long); Enon, 18 miles (20 per cent., long and stony); Darlington, 23 miles (18 per cent., stony); Baden, 40 miles (15 per cent.); Emsworth, 52 miles (17 per cent.).

The Packard Transcontinental Tour.

(Continued.)

(Communicated by the Packard Motor Car Company.)

On July 2 and 3 the strains on the machine had been very heavy at times; the flywheel shields had been polished, the battery box scraped and scoured, and the shovel handle badly shredded—all from driving through and over the brush—but the operation of the car had not been affected, except that at 882 miles (cyclometer) the differential box inadvertently slid on to a ridge, causing the chain to stretch and run hard. At 888¼ miles the clutch was oiled.

On July 4 the car was run from Promontory over Corinne, Brigham and Ogden to the capital of Utah, the start being made at 7:12 a. m. and Salt Lake City reached at 3:45 p. m. The distance was supposed to be 90 miles, but the cyclometer advanced from 940 at Promontory to 1,046 at the garage in Salt Lake City. This day's run was rather uneventful and driving easy, though it was plain that the car had suffered from the ordeals of the previous days. The front spring, inverted elliptic, had sagged after the abuse to which it had been subjected in the gullies and "twisters" (a twister is a gully with converging banks, or crossing the trail at an acute angle); the lug holding the rear axle brace bar on the right was broken; the pitch of the chain was irregular—yet everything operated

sufficiently well to cover 100 miles in eight and a half hours.

From Promontory the road soon led down close to the level of the white, barren marshes adjacent to Salt Lake, which are getting larger in area each year, while the lake grows constantly smaller, being deprived more and more of its afflux of fresh water from Bear Creek and other streams, because this water is used for irrigation in evergrowing measure as the settlement of Jordan Valley and the contiguous sections increase in population.

For persons emerging from desert land the first sight of Corinne was refreshing. Trees, especially the splendid poplars which characterize Mormon districts, grow everywhere. Streets are broad and well kept. Main ditches and laterals filled with water from Bear Creek extend in all directions, and the river itself flows full to the brim through the outskirts of the town, where a model road almost teemed with carriages and picnic wagons decorated with flags and full of festive clad people bent upon celebrating the Day of Independence.

In Brigham, ensconced at the foot of the Wasatch Range, testimony to Mormon thrift and agricultural enterprise multiplied. Here the first motor car (an Oldsmobile) was seen since leaving Sacramento. Nods of fellowship were exchanged in passing.

The road to Ogden followed the foot of the mountain—high, rugged and streaked with snow, only a narrow strip of tilled and closely built up area intervening, while the highly cultivated valley extended for a considerable but irregular distance to the right, emerging by a gently undulating slope into the lake or marshes. Arrival at Ogden, 12:15 p. m.

After the start from Ogden, at 1 p. m., for Salt Lake City, 36 miles, the course led along a broad, fairly well kept road with few grades, the valley all the time to the right, and seemingly prosperous villages nestling under the mountains.

Shortly after arrival in Salt Lake City the car was attached by a sheriff as security for a claim for damages against the Packard Motor Car Company, of Warren, Ohio, filed by an individual who had desired to go with the car across the continent in the capacity of a pathfinder.

On July 4 and Sunday, July 5, nothing could be done to liberate the car, which remained in the sheriff's care. The necessary formalities extended to the afternoon on Monday, July 6, and then there were gasoline arrangements to be looked after, so the start was not made until Tuesday morning. Meantime the rear brace lug had been replaced, by the assistance of a blacksmith, and all the machinery had been inspected, cleaned and oiled, with the exception of the motor proper, which was not touched.

The start from Salt Lake City was made at 7:20 a. m. Civilized roads led through Murray, Lehi and American Forks to Provo—the "Garden City of Utah"—which was reached at 10:45 a. m., the cyclometer showing 1,092, or 46 miles from the start. Large smelting and refining works were seen at Murray and Lehi, and at the latter place the road had been improved with cinders. There is some rough country at the boundary line between Salt Lake and Utah counties, where a good retrospective view of the Lake Valley, which here narrows down close to Jordan River, is obtained. Dinner and 3 gallons of gasoline were obtained at Provo, and the journey continued at 12:35. Owing to misdirection, a wrong street was followed out of the town and an unexpectedly bad stretch of heavy yellow clay encountered, about 300 yards along, where it was all the car could do to pull through, though the grade was not over 5 per cent.

The road followed led through the interesting village of Spanish Forks, 4 miles out of the best way, and, moreover, caused the car to get mired near an overflowing irrigation ditch when afterward cutting



THE MAIN STREET, BRIGHAM.



SCHOOL HOUSE IN STAR VALLEY.



CORINNE AND BEAR CREEK.



SPANISH FORK CANYON.



SMELTER AT MURRAY.

across to the right road. This happened at 2:15 p. m., near the entrance to Spanish Fork Canyon. Willow, sagebrush and scrub oak were cut down to get traction out of the morass, and the chains carried for this purpose were wrapped around the tires. By this means the car finally extricated itself from the first trouble of this kind at 2:45 o'clock, and a few moments after the canyon was entered, where "a good road for slow driving" and pleasing scenery were found.

At Castello Springs in this canyon elaborate but decaying buildings and a large dancing estrade bore witness to an unsuccessful attempt to create a pleasure and health resort. The hot water from the springs was of the variety said to be health giving because it tastes bad. Up to the Mill Ford the canyon was narrow, and the road up and down with grades exceeding 12 per cent. Cliffs of red sandstone or similar rock hedged the narrow passage.

Farther on beyond Thistle Junction the canyon broadens into a valley some 100 to 500 yards wide, with many signs of husbandry and cattle raising, and the rock cliffs alternate with banks of white clay are scattered growths of timbers. At one point in this valley a big stone concealed in an innocent looking bush was bumped against, which turned the rear axle with springs and braces.

Going in and out of Thistle Junction, where the D. & R. G. railway sends out a branch road through a canyon extending southward, the passage is narrow and the grades are steep for a while, and from one point the little railway village looks very picturesque, hemmed in, as it seems to be, on all sides by mountains of considerable height, and occupying a little triangular space at their base with absolutely no room for expansion. Tucker was reached at 7:20 p. m.; cyclometer, 1,141.

According to the British Consul General automobiles are increasing rapidly at St. Petersburg. German, French and Belgian makers supply nearly the whole demand.

A Fortunate Escape.

An illustration of the dangers of one car attempting to rush past another car in ordinary pleasure driving, where the road is barely wide enough, unfortunately occurred to a member of the club recently. The Rev. Arundell Wharton was driving up to Shropshire, and when 5 or 6 miles on the London side of St. Albans, without any warning being given, or at least without any audible to either of the persons in the car, felt the offside violently struck. The Hon. M. S. Bowen was at the moment steering, while Mr. Wharton was sitting on the foot-board adjusting the lubricator. Mr. Bowen managed to keep a straight course, and in an instant a large 15 horse power Panhard rushed by on three wheels, plunging from side to side of the road, and, of course, swaying in a horrible way. In a short distance it ran off the road, and completely overturned, lying on its back with the wheels still spinning. Mr. Bowen had, with much presence of mind, avoided its gyrations, and pulled up. On returning, he and Mr. Wharton found that by almost a miracle the only personal injury was a few bruises on the mechanic's leg, the two gentlemen with him being unhurt. The poor Panhard appeared to be smashed a good deal, one wheel being wrenched off the axle, and lying (or, rather, the rim of it, for the spokes were torn out at both ends) some way off.—*Automobile Club Journal*.

An English contemporary describes an electric puncture detector based on the following principle: A thin wire is stretched across the tire about one-half inch out of contact with it. When a nail is picked up it will break this wire, which releases a spring actuated switch and thereby short circuits the ignition battery through a fuse wire. The fuse is immediately blown and gives notice to the driver that a nail has been picked up, and he can then stop and extract the nail, often before it has completely penetrated the tire.

COMMUNICATIONS.

Grades of Gasoline.

Editor HORSELESS AGE:

What is the difference between "common stove gasoline" and other gasoline? I have been unable to get any definite answer from the dealers.

Is there any difference in power between low test and high test gasoline? I have heard very intelligent drivers claim opposite results.

E. H. BALDWIN.
["Stove gasoline" is a brand sold by the Standard Oil Company which is claimed to vary between 72° and 74° Baumé. Some users claim to have found it even of lower test than 72°. The Standard Oil Company do not guarantee the test. The actual power value of the gasoline changes little with the density, as you may see by referring to the table published in our issue of September 9. The power of a given motor may vary considerably with fuels of widely differing density, as, for instance, an insufficient charge may be drawn in when the heavy oil is used, or it may be incompletely vaporized. The effect of varying the grade of gasoline may thus be different with different motors and carburetors.—Ed.]

An Auto Trip in Tennessee.

Editor HORSELESS AGE:

A few days ago I made a trip in my gasoline runabout from Knoxville to Chattanooga, Tenn., a distance of 122½ miles, directly through the mountains of Eastern Tennessee. This is the first time, I believe, that this particular route has been covered by an automobile, and the population, in town and country, showed great curiosity concerning the vehicle.

Between Sweetwater and Athens I found the roads in very bad condition, in fact almost impassable. The roads were

full of deep mud holes and innumerable rock ridges. Just outside Sweetwater the wheels sank into a mudhole and were nearly submerged, and the differential gear case was entirely imbedded in the mud. It was necessary to procure rails from a nearby fence to get the machine out. After getting out the wheels were solid disks of mud, approaching in appearance chariot wheels.

At Charleston I got on to a fine piece of piked road and made the run from there to Cleveland, 12½ miles in thirty-five minutes, or at the rate of 24 miles per hour.

East Tennessee has been termed the Switzerland of America, and on this particular day, when the atmosphere was exceedingly clear and cool, making the outline of the mountains perfectly distinct, the views were certainly most beautiful. Tourists who are yearning for trips in little traveled portions of the country, which offer delightful scenery, could hardly do better than to come down here.

I made the run between Knoxville and Chattanooga, 122½ miles, in nine hours, forty minutes. The run includes many heavy grades, some over 20 per cent.

COWAN ROGERS.

Adjustment of Steering Wheels.

Editor HORSELESS AGE:

Should the front wheels of an automobile nose in or be exactly parallel when at work? If the former, how much, presuming the wheels to be 28x3?

W. F. PERSONS.

[The wheels should evidently be parallel when at work on moderately heavy roads. The road resistance encountered by the wheels has a tendency to spread them (provided the pivot centres are inside the wheel planes), and it is therefore customary with manufacturers to adjust the wheels to slightly nose in when standing on the shop floor. We know of no general rule being followed, but one manufacturer, with 34 inch wheels, makes the distance between tires in front of axle one-half inch less than in rear of axle.—Ed.]

Tire Query.

MOSCOW, RUSSIA, September 2.

Editor HORSELESS AGE:

Kindly state the reason why automobile wheels are not fitted with solid rubber tires; have they not answered the purpose, or what other reason is there against their use? I have often heard complaints about the defects of pneumatic tires, and have been thinking of using solids, but shall reserve my decision until receiving your advice.

A. MALINOWSKY.

[Solid tires have not proven successful for pleasure cars in this country, except in the case of slow running electric cars, with large diameter wheels. The probable reasons are that most cars are geared too high, and that the average of our roads is too poor. In Great Britain there are a number of builders who fit solid tires as a regular equipment, and some private owners are using solid tires in front, even on high powered cars. Of late it has also become customary with some users to keep a spare set of wheels fitted with solid tires, for use at times when the roads are greasy and muddy, as solid tires prevent skidding and also because repairing punctures is particularly disagreeable when the roads are muddy. We believe that for speeds not to exceed 15 miles an hour on good roads, and proportionately less on bad, with large diameter wheels and the body well suspended by long flexible springs, solid tires of adequate width would prove a success; provided the mechanism of the car is not too delicate. The large majority of users at present want to go faster, and that is the reason solid tires are so little used on pleasure cars.—Ed.]

In the process of vulcanizing, crude india rubber is torn up (masticated as it is called), then mixed with various sulphites and colored. It is then packed into molds of metal or plaster of paris, and subjected to heat in a high pressure boiler called a vulcanizer. The pressure varies as a rule from 85 pounds to 100 pounds per square inch.

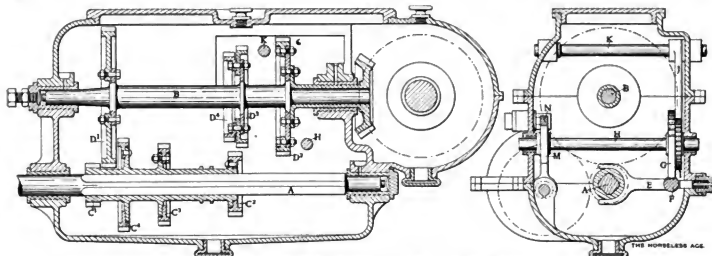
...OUR...
FOREIGN EXCHANGES.



The C., G. & V. Change Gear.

Some three years ago all the larger foreign cars, equipped with four forward speeds and reverse, required either two levers for operating the gear or a single lever, with both a pivotal and sidewise sliding motion. Lately, however, much importance is placed upon provisions for obtaining all gear variations by means of a simple motion of a single lever, and this has led to the use of cam plates and intermittent motions in the mechanism for operating the change gear. A gear in which racks and gear wheels cut with teeth on a portion of their circumference are used has recently been patented by Messrs Charon, Girardot & Voigt. With this gear by pushing the lever in one direction the gear passes successively from the highest speed through the various intermediate speeds to the lowest speed and then to the reverse. By moving back the lever in the opposite direction inverse results are obtained.

Referring to the sectional illustrations herewith, A is the clutch shaft or first transmission shaft and B the second transmission shaft. The shaft A is of squared section, and has slidably mounted upon it a sleeve with four gear pinions—C', C', C' and C'. Rigidly secured to the shaft B are four corresponding gear wheels, D', D', D' and D'. When the set of shifting pinions is moved from its extreme left to its extreme right position the different pairs of gears are brought into mesh in turn—first the set C' D' (first or slowest forward speed); then the set C' D' (second speed); next C' D' (third speed) and finally the set C' D' (fourth speed). The motion of the shifting pinions is effected by means of the forked arm E engaging with a groove on the hub or flange of the shifting pinions, the rack F, a partially toothed wheel G on the shaft H, a full toothed



TWO VERTICAL SECTIONS THROUGH C., G. & V. CHANGE GEAR.

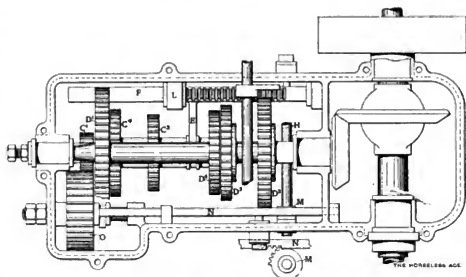
wheel I on the same shaft and a gear sector J on the shaft K in mesh with the gear wheel I. The shaft K extends through the walls of the casing, and at one end is suitably connected to the gear shifting lever located conveniently to the operator. When the gear shifting lever is in the most forward position the pinion C' and gear D' are in mesh, and the car is geared for highest forward speed. When the lever is moved back from this position it imparts a continuous motion to the pinion sleeve until the pinion C' has just passed the gear D'. Then the toothed portion of the wheel G has passed the teeth of the rack F, and farther motion of the gear changing lever does not affect the set of sliding pinions, they being locked in place by the full portion of the wheel G on the one hand and by the arm E abutting against the bearing L on the other.

As soon as gear G and rack F pass out of mesh with each other, a second partially toothed wheel M, near the opposite end of shaft H passes into mesh with the rack N. This rack controls an intermediate pinion O for the reverse, which ordinarily occupies a position so far to the left that pinion C' may pass gear D' without engaging with O. The effect of the meshing of partial gear wheel M with rack N is to move intermediate pinion O from its extreme left to its extreme right position and into mesh with both C' and D', thereby causing the motion to be transmitted from the shaft A to shaft B in the reverse direction. The gear wheel B and rack N also lock the intermediate pinion O in place as long as the sliding pinions on shaft A are in a position to receive motion from the gear changing lever.

Attention should be called to the fact that one of the bearings for each of the two shafts is closed at the outer end, thus preventing the lubricant from working out of the case, and that the end thrust of the bevel gear, and apparently also of the clutch spring, is taken up by hardened steel step bearings, that for the bevel pinion being adjustable.

Frankfort Automobile Races.

The third annual race meet of the Frankfort Automobile Club was held on the Oberforsthaus mile track, near Frankfort-on-Main, on Sunday, August 30, and proved to be the most successful of the club's meets so far. The weather was fine and the attendance was estimated at over 15,000. The program comprised nine events, beginning with motor bicycle races and ending with races for heavy cars. Some of the events were reserved for "Herrenfahrer" (amateur drivers, or, rather, drivers sans reproche from a social standpoint) and others for professionals. A parade previous to the races had to be abandoned, because it had been neglected to obtain a police permit for it. The races only started at 3 p. m., and when the last one was run off it was about 7:30. The



HORIZONTAL SECTION THROUGH C. G. & V. CHANGE GEAR.

different events did not follow each other with the requisite promptness, and notwithstanding the fact that the most interesting races were reserved for the finish, the attendance showed unmistakable signs of waning interest toward the end. Provisions had been made for rendering immediate medical aid to anyone who might be injured during the races, but, fortunately, there was no occasion for it. The only accident of the day was due to a tire going flat on one of the cars in the event for heavy racers, and resulted in three machines being disabled, as far as completing the race was concerned. Following is a summary of the events:

Race for motor bicycles, 2½ miles, amateur and professional, for four prizes. P. Philielens, 2½ horse power Antoine, winner; time, 4:46. A. Opel, 2½ horse power Opel, second; time, 5:03.

Five mile amateur race, for cars up to 10 horse power, for three prizes. Fritz Opel, 9.5 horse power Opel-Darracq, winner; time, 8 m. Louis de Groulart, 9.5 horse power Benz, second; time, 8:15.

Five mile professional race, for cars up to 10 horse power, carrying two grown persons, for three prizes. Ugo Riccardi, 9.5 horse power Benz, winner; time, 7:42. Wagner, 9.5 horse power Opel-Darracq, second; time, 7:37.

Five mile handicap race, limited to members of the Frankfort A. C.; five prizes. Fritz Opel, 9.5 horse power Opel, winner; time, 4:50 (2 1-5 miles handicap). M. Th. Bräuning, 8.5 horse power Adler, second; time, 5:03 (2½ miles handicap).

Eight mile amateur race, for touring cars up to 16 horse power, driven by owner and occupied by four grown persons; three prizes. Wagner, 14 horse power Opel-Darracq, winner; time, 11:09. Willmann, 14 horse power Opel-Darracq, second; time, 11:43.

Ten mile amateur race, for heavy cars up to 60 horse power, to be driven by owner and occupied by one other adult person; two prizes. Willy Poege, 60

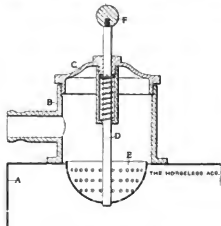
horse power Mercedes, winner; time, 12:55 1-5. Marius Barbaroux, 46 horse power Benz, second; time, 13:28.

Ten mile professional race, for cars up to 60 horse power; three prizes. Beconais, 35 horse power Opel-Darracq, winner; time, 13:33. Willmann, 19 horse power Opel-Darracq, second; time, 14:18.

The events closed with a triangular 10 mile race between the winners in the last three events for a cup offered by Louis Peter, proprietor of the Mitteldutsche Gummiwaren Fabrik, to be won twice in succession by the same driver before it becomes his property. This event was won by Poege, 60 horse power Mercedes, in 12:51. Poege is spoken of as a possible member of the German team for next year's Gordon Bennett race.

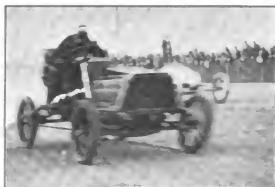
A New Circulation Indicator.

A correspondent in the *Automobil Welt* describes a novel circulation indicator he has fitted to his car, which is shown in the sketch herewith. A represents a portion of the water tank, to which is secured the casting B, serving as a connection piece for the hose through which the water returns from the jacket and also to receive



CIRCULATION INDICATOR.

the filling cap C. The cap C is drilled centrally to receive the rod D, to the lower end of which is attached a tin cup E perforated with small holes, as shown. To the upper end of the rod is fastened a metal ball F, and when the water is not



LA ROCHE AT FULL SPEED.



CANNON WINNING THREE MILE RACE.

circulating the rod is held in a certain position by a light coiled spring surrounding it just below the cap C. The ball F is then at a certain height above the cap C. When the water is being circulated in the system it returns through the hose connecting to the casting C and flows into the cup E and through the perforations thereof into the tank. As the perforations in the tank are small, there is always a certain amount of water in the cup, which compresses the spring and draws the ball F nearer the cap C. The stronger the circulation the greater will be the amount of water in the cup and the lower the position of the ball.

The M. P.'s who championed the cause of the motorists in the recent automobile legislation in England have gained little but criticism by their efforts. It is stated that one of the motoring M. P.'s made eighty speeches in favor of the abolition of the speed limit and sundry clauses of the original bill, and one of the English motoring papers unappreciatingly remarks that it is fortunate he made no more, for the law would probably have been only so much worse.

The Providence Races.

The automobile races at the Narragansett Park track at Providence on last Saturday, although not as sensational as many that have been run, were entirely successful and

for bicycles. There were six starters in this race. Jacob Deroches, riding a "Ben Hur" motor, took the pole at the start and held first place throughout the race, winning in 6:14. James Meyers, on an Orient, was second, winning out over Oscar Hedstrom on an "Indian."

In the second race, that for gasoline cars under 1,200 pounds, there were only two starters: A. R. Bangs, of Boston, driving a Franklin car, and L. H. Roberts driving an Orient buckboard. The Franklin was far too speedy for the little buckboard and lapped it in the third mile. The time for the 5 miles was 6:25 2-5.

The third race was for electrics over a distance of 2 miles. It was the least interesting of any of the races; in fact, it was almost a farce. There were five entries for the race, four of which were Waverleys and one a National. Only two of the Waverleys started, one of them being a surrey. The lighter machine took the lead, the public hardly realizing that there was a race on, and finished about a quarter of a mile ahead of the surrey. The time for 2 miles was 4:48 4-5, nothing remarkable from a racing standpoint, but interesting in view of the fact that the machines were claimed to be regular stock cars and not geared in any way for fast work.

The fourth race was for steamers, all weights, for a distance of 5 miles, which was later changed to 3 miles. Five of the seven entries were Stanley machines, and the others a Cannon and a Grout. The Cannon got a poor start, two of the Stanleys taking the lead and keeping it for the first mile. At the finish of the second mile Cannon had succeeded in working up to the first place with L. S. Ross and Frank Durbin, both in Stanleys, in second and third position respectively. This position was held during the 3 miles, Cannon winning in 3:49 4-5.

The next race was for cars of all motive powers under 1,800 pounds for a distance of 5 miles, to be run in two heats, the first three in each heat to qualify. There were six entries in the first heat, including F. A. La Roche's Darracq and the Decauville driven by Paige. The others were two Stanleys, a Stevens-Duryea and an Orient buckboard and all withdrew, evidently



START IN TEN MILE RACE.

realizing the hopelessness of running against the two big machines. La Roche took the lead at the start and made the first mile in 1:05 2-5. The race was close throughout and several times it looked as if Paige was going to get by, but each time on the turns La Roche managed to come out a few feet ahead and held his place down the stretches. It was in this race that the front tire on Paige's machine went wrong. La Roche's time for the 5 miles was 5:30 1-5.

In the second heat there were six entries and all of them started, as follows: Louis Raffalovich, Renault; G. C. Cannon, Cannon; Paul Sartori, driving A. G. Vanderbilt's Mercedes; C. Schmidt, Packard "Gray Wolf"; L. F. N. Baldwin, Stanley, and J. N. Snow, Peerless. The heat was a walk-over for the "Gray Wolf," and before the finish of the 5 miles Schmidt had lapped nearly all of the others. His time was 5:35 4-5, the first mile being made in 1:05 3-5. The result of these heats left the Darraq, Decauville and the Packard in the finals and promised a pretty race. Before this race, however, there was an invitation race for 5 miles for Peerless touring cars, owners driving. There were five starters, as follows: E. Ray Speare, of Boston; R. M. Garfield, of Worcester; H. Emmet Rogers, of Auburndale; E. Hylan, of Lowell, and A. E. Bradley, of Hartford. The cars were driven with the tonneaus on and the race attracted considerable attention as being the only real race of amateurs on the program. It was won by Mr. Rogers, with E. Hylan second. The time was 8:18. After having seen the previous races run in the time of 5:30 these machines only seemed to crawl along the track.

At the conclusion of this invitation race, it was announced that the "Gray Wolf" would go against time for a distance of 5 miles. C. Schmidt drove the car with considerable skill and gave a pretty exhibition, making the 5 miles in 5:32. He used Oldfield's method of making the turns—that is, running close to the outside rail on the stretch and taking the turns close to the pole.



CHARLES SCHMIDT ON "GRAY WOLF."

The next race was by far the best of the day, it being a match race for 5 miles between La Roche, Paige and Schmidt. La Roche took the lead from the start and made the first mile in 1:05. He kept the lead throughout the race, although both Schmidt and Paige held him very close. At no time during the race was there over two lengths between the cars. In the clouds of dust on the turns it looked as if the machines would run each other down, but the race was run without an accident of any sort. The Packard "Gray Wolf" finished second, with the Decauville third.

While these machines were cooling off for the final heat, G. C. Cannon went against his record of 1:02 4-5 for steam carriages, but was unable to do better than 1:06.

Next came the final heat for all motive powers under 1,800 pounds for 5 miles. This was another close finish between the Darraq, Decauville and Packard. The Decauville seemed to be running better than previously and made the best time for the day—that is, 5:28 4-5 for 5 miles. In the third mile the best time for a single mile was made, 1:04 2-5. La Roche finished sec-

ond and Schmidt in the "Gray Wolf" closely followed him.

The last race of the day was for all weights and motive powers for a distance of 10 miles. There were six starters in this race, as follows: F. A. La Roche, Darraq; J. N. Snow, Peerless; Henry Paige, Decauville; H. L. Bowden, Columbia gasoline; A. G. Vanderbilt, Mercedes, and C. Schmidt, Packard. It was an easy race for Paige and he made excellent time for 10 miles, 10:48 2-5. The Packard "Gray Wolf" made a good showing and took second place.

Taking all in all the meet was a success, although the entry list was not large and the classification was capable of improvement.

After the races a very enjoyable smoker was given by the Rhode Island Club in their rooms, and the out of town people were grateful for their entertainment and their arrangements.

There will be a competition of automobile lamps in connection with the coming Paris Show.



THE CROWD WATCHING THE RACE.

Completion of Whitman's Trans-continental Tour.

L. L. Whitman and E. J. Hammond, who toured the continent in an Oldsmobile, arrived in New York city on Friday last, hav-



ALONG THE ERIE CANAL.

ing been on the road seventy-three days since leaving San Francisco. The actual number of running days is said to have been fifty. Both of the tourists stated that they had lost about 20 pounds in weight during their perilous journey. The message from Mayor Schmitz, of San Francisco, was delivered to Mayor Low, of New York city, at 11 a. m. on Saturday at the City Hall. Quite a crowd congregated to view the mud covered car and its travel stained occupants. From Peekskill we received from Mr. Whitman the following letter, under date of September 15:

"We made Peekskill today at noon. The widespread storm struck here with great fury, and we gave up the attempt to reach New York today, as we hoped to do when we left Poughkeepsie in the morning. We have made rapid progress lately, averaging some 140 miles per day. We spent part of one day at Niagara Falls, where we took in some of the beautiful views. We passed the custom house at 11 a. m. Sunday and made the run across New York State to this place in just two days.

"We found better roads in Ontario, Canada, than in New York. I call them bad

as far as Albany, but they are much better down this side of the Hudson. About the finest drive in America is up this side of the Hudson River, where one passes hundreds and hundreds of beautiful old country residences, surrounded by old maples, elms, etc. The road for 100 miles is lined with beautiful trees, often meeting overhead.

"Our time from Omaha, while far below what some chauffeurs say they can do, is not at all a bad showing—1,650 miles in eleven days."

Trade Literature Received.

Frost Manufacturing Company, Kenosha, Wis.—The Forcarr auto pump.

Weston-Mott Company, Utica, N. Y.—Catalogue of automobile wheels.

Cullmann Wheel Company, 521 and 523 Larrabee street, Chicago, Ill.—"Automobile Sprockets."

Schug Electric Manufacturing Company, 246 Jefferson avenue, Detroit, Mich.—Schug spark coils.

Neustadt-Perry Company, 826 to 830 South Eighteenth street, St. Louis, Mo.—Catalogue of automobile parts.

The Automobile Equipment Company, 251 Jefferson avenue, Detroit, Mich.—Catalogue of rain aprons, chain boots, number plates, etc.

New Incorporations.

The Reliance Automobile Company, Pierre, S. D.—Capital, \$250,000.

The Motor Storage Company, of Chilli-cothe, Ohio, incorporated in South Dakota.—Capital, \$12,000.

Ernest J. Willis, of New York—Capital, \$75,000. Directors: Ernest J. Willis, Raymond Cole, W. W. Myers.

Columbia Motor Vehicle Company, Hartford, Conn.—Capital, \$2,000. Incorporators: Lucius F. Robinson, A. B. Welsin and M. Lascan Bennett.

The New York Garage Company, of Newark, N. J.—Capital, \$50,000. Incorporators: James B. Richardson, Walter H. Bond, Gardner W. Kimball.

The Kirk-Hall Company, Toledo, Ohio.—Capital, \$10,000. Incorporators, Edward A. Kirk, Charles M. Hall, Edwin J. Marshall, Harold W. Fraser and George C. Bryce.

The Fisher Automobile Company, of Mooresville, Morgan County, Ind., was incorporated on September 2, with a capital stock of \$25,000. J. S. Comer, H. C. Seacore and D. F. Swain, Jr., are named as directors.

The D. M. Tuttle Company, Baldwinville, N. Y.—Capital, \$60,000. Directors, Daniel M. Tuttle, William H. Lindly, Frank G. Bell, James F. Williams and Hiram Howard. To manufacture boats and automobiles.

The Alpha Motor Cycle Club, of Brooklyn, New York, has been incorporated, with the following directors for the first year: Charles L. Simms, R. L. Young, D. R. Thompson, Edgar W. Myatt, George M. Fisher, Jr., and F. Schebe.

MINOR MENTION



Virtue, Pound & Co., of Rushford, Minn., and makers of the Thiem gasoline engines, have commenced the manufacture of automobiles.

A meeting of the creditors of the American Motor Carriage Company, of Cleveland, Ohio, was held at the offices of the receiver on September 16.

Whitten & Cameron, automobile dealers of Springfield, Mass., have dissolved partnership. The business will be continued by J. E. Whitten and E. R. Clark.

The State Board of Equalization of Minnesota is experiencing much difficulty in assessing the automobiles of the State, there being no precedents by which to arrive at just valuations.

Appraiser Whitehead, of the Port of New York, has held up thirteen foreign automobiles on the claim that the owners are seeking to import them without paying duties on their full value.

We are informed that in a 5 mile race at Lowell, Mass., on September 12, A. E. Morrison, of Boston, won in a Peerless stock machine. Second place was taken by Louis McDermott, also in a Peerless.

The trustee of the Spaulding Automobile and Motor Company, of Buffalo, N. Y., has issued a summary statement showing that out of \$2,700.05 collected 14.45 per cent. has been paid on the claims of creditors.

Secretary Frank Weldon, of the Southern Inter-State Fair, to be held at Atlanta, Ga., is promoting a 100 mile race between an automobile and a railroad train, to be held along a Southern railway line at the time of the fair.

An automobile road to miles long has been constructed near Asheville, N. C., by the Howland Improvement Company, of that city. An abandoned trolley grade and lumber road were utilized, and the road is said to be one of the finest in the country.

Julio Limantour, a prominent Mexican statesman and one of the first members of the Automobile Club of the City of Mexico, has purchased an American make of touring car at a total cost of \$12,500. The machine will be the largest and speediest in Mexico.

A series of automobile races is planned for Grand Rapids, Mich., to take place on September 26. It is expected that Barney Oldfield's "999," together with its duplicate, run by Tom Cooper, will be a feature of the event. Efforts are also making to secure the Paris-Madrid racers of Henri Paige and Jules Sinncholle.

During an automobile race at the Caledonia County Fair, at St. Johnsbury, Vt., a machine driven by Dr. John M. Allen dashed over an embankment at a speed of 50 miles an hour, instantly killing Herbert Lamphere, his companion. The doctor



ENTERING PECKSKILL.

had both legs broken, a shoulder dislocated, and also sustained a severe wound on the nose.

It is reported that a number of prominent business men of Shelbyville, Ind., are planning the incorporation of a \$300,000 company, to manufacture automobiles.

An automobile belonging to Dr. Bothfield, of Newton, Mass., was ruined by fire at Lynn, Mass., on September 7.

The first meeting of the creditors of the bankrupt Northern Automobile and Motor Company, of Milwaukee, Wis., is announced for September 30.

The commissioners of the South Side parks of Chicago, who once ruled automobiles out of the parks under their control, have decided to use a car as the official vehicle of inspection.

The American Motor League has devised a series of nine road signs similar to the warning signs that are in use by European automobile associations, and is erecting them through its local consults.

In connection with the reincorporation, in Michigan, of the Packard Motor Car Company, of Warren, Ohio, a notice of dissolution has been filed in West Virginia, where the original incorporation was filed.

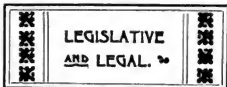
We are informed that Charles W. Gray (president of the Chicago Automobile Club) and wife made a trip from Chicago to Detroit in Mr. Gray's Peerless touring car, on the occasion of the recent Detroit races.

The referee in bankruptcy for the General Automobile and Manufacturing Company, of Cleveland, Ohio, has called a first meeting of creditors for September 30. A trustee will be appointed and other business transacted.

Glenn Lumbard, of San José, Cal., recently made a trip from San Francisco to San José on a 2½ horse power California motor bicycle in a very creditable time. The machine has 1½ inch belt transmission and carries a supply of gasoline sufficient for 100 miles.

Rogers & Co., of Knoxville, Tenn., recently ran a locomobile steam sloop from there to Sevierville, a distance of 30 miles, for the benefit of a proposed automobile mail line between these points, which is at present being covered by fast hack, which makes the time in four hours. The time made with the machine was 2 hours and 6 minutes. It is almost certain that the line will be established at an early date.

E. S. Yousse, 46 North Fifth street, Reading, Pa., has purchased all the stock and fixtures of the Meteor Engineering Company of that city, makers of Meteor and Reading steamers. The purchase consists of all the finished and raw material, all the blue prints, drawings, patterns and jigs, as well as quite a lot of machinery and special tools. The balance of the stock of machinery was sold at auction on Monday, September 14. Mr. Yousse will continue to furnish parts for Reading and Meteor steam cars.



Lawrence W. De Mott, who was recently arrested near Bryn Mawr, Pa., for excessive speeding, has been fined \$25 and costs.

The residents of Webster Groves and Clayton, suburbs of St. Louis, Mo., are complaining of the reckless speeds of automobilists.

Port Chester, N. Y., has renewed its crusade against violators of the automobile law. Six arrests were made in one day recently for violation of the 8 mile speed limit.

Through a lack of definiteness in the local automobile law, the city clerk of Youngstown, Ohio, does not know whether to charge \$1, \$2 or \$5 for licenses. The city council is to act in the matter.

The automobile ordinance pending before the city council of Detroit, Mich., will probably prescribe speed limits of 6 and 10 miles an hour within and without a half mile circle from the centre of the city.

Milton J. Budlong, of the Electric Vehicle Company, Hartford, Conn., has vacated the appeal he made from a recent fine for running his automobile faster than 15 miles an hour. The costs to date amounted to \$123.29.

A time trap for automobilists has been established on the 12 mile stretch of road between Woodylyne and Far Rockaway, Long Island, N. Y. Winthrop E. Scarritt, vice president of the A. C. A., was one of the earliest victims.

A. B. Duvall, corporation counsel at Washington, D. C., has rendered an opinion stating that he does not believe it expedient to impose an arbitrary age limit requiring automobile users to be over a certain age, as he thinks that age cannot be considered a sole factor in determining competence to run a machine.

Endurance Contest Entries.

It is understood that the entries for the Endurance Contest of the N. A. A. M. are substantially as follows:

The Electric Vehicle Company, the Winston Motor Carriage Company, the Packard Motor Car Company, the Olds Motor Works, the Knox Automobile Company, the Haynes-Apperson Company, the Auto-car Company, the George N. Pierce Company, the Searchmont Automobile Company, the Locomobile Company of America, the Peerless Motor Car Company, the Pope Motor Car Company, the J. Stevens Arms and Tool Company, the H. H. Franklin Manufacturing Company, the Cadillac Automobile Company, the Northern Manufacturing Company, the Kirk Manufacturing Company, the Elmore Manufacturing Company, the E. R. Thomas Motor Company, and the White Sewing Machine Company. It is possible that the Waltham

Manufacturing Company and Grout Brothers, of Orange, Mass., will also enter. The Locomobile Company will enter both steam and gasoline vehicles. In all it is expected there will be forty to fifty machines in the run.

The races which were to have been held at Pittsburgh in connection with the Endurance Contest have been given up. It is found impossible at this season of the year to secure the necessary water transportation to the track.

Preparations for the New Motor Cars Act in England.

According to an interview with officials of the Motor Union, the headquarters of which are in Downing street, Piccadilly, London, vigorous preparations are being made to meet the situation created by the passage of the Motor Cars Act. A special committee appointed to consider the subject has decided that the objects to be aimed at are (1) the working of the act with the minimum of friction; (2) the education of the public, so that at the end of three years its worst features may be modified. The general lines upon which action will proceed have been laid down as follows: (1) To secure the adoption of practical and reasonable Local Government Board regulations as regards numbering, registration, licensing, rate limit and other matters; (2) to bring influence to bear upon the county and borough councils to insure that no applications are made under Section 9 to the Local Government Board to fix the 10 mile limit, except for really dangerous roads; (3) to resist proposals to close any roads entirely and absolutely, under Section 8, to motor car traffic; (4) to secure the ready issue of numbers and licenses by the county authorities, so that all automobilists who at present own and drive cars shall be in possession of their numbers and licenses on January 1 next, and be able to ride and drive forthwith; (5) to organize for the next parliamentary and county council elections.

The Motor Union is an excellent organization, thoroughly equipped for such work. Members of the Automobile Club of Great Britain and Ireland and its affiliated clubs are ipso facto members of the Motor Union. Its present total membership is over 4,000. But something more is required for the work in hand. There are altogether 268 authorities in England and Wales endowed with powers under the act—namely, sixty-four county councils, sixty-seven county boroughs and 136 non-county boroughs, and the Corporation of the City of London. It is no secret that not a few of these are at present inclined to take full advantage of the powers conferred upon them, and will endeavor to have roads under their control scheduled at low speed (10 miles an hour) or closed to motors altogether as "dangerous."

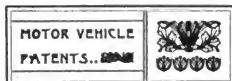
The Motor Union proposes to form in every town in the kingdom a body of honorary correspondents, whose chief

duty will be to watch the local authorities and keep the head office fully informed as to their proposals so that steps may be taken to oppose before the Local Government Board unreasonable proposals calculated to press hard upon motor traffic. In the few towns such as Manchester, Liverpool, Nottingham and Derby which possess affiliated local automobile clubs, the officers and committees of these will be relied upon to do the necessary work, but in the majority of towns and counties no organization at present exists. The Union has recently received many welcome offers from individual automobilists to act as correspondents, but still much remains to be done to make the network complete. Great stress is laid upon this matter, as it is considered of paramount importance to insure that a uniform system of administering the act shall be applied all over the country, and to guard against the imposition of irritating and improper restrictions in one anti-motor county which do not exist in another.

The secretary of the Motor Union is already in communication with the officers and members of the London County Council, which is the local authority under the act in the administrative county, and it is hoped as a result that London will vote against the 10 mile limit. Great efforts are to be made to show that this limit should not be enforced in the metropolitan area. Automobilists urge that a 10 mile limit in London would not only be most vexatious, but that the lead of London would be followed by other towns. On the other hand, if London refused to adopt the 10 mile limit, it would supply a very strong argument against its enforcement in the provinces.

It is believed that in the coming discussions as to the regulations under the act the car itself will prove the best educational instrument in the possession of the automobilist. Whenever and wherever the schedule of roads is mooted, either the local clubs or the correspondents of the Motor Union will approach the officials responsible and those entrusted with the local government of the district, and take them in their cars over the roads on which it is proposed to establish the lower limits. By this means the highway authorities will, it is hoped, gain a proper conception as to how to miles an hour on a motor works out in practice; they will see for themselves how infinitely easier it is to pull up or steer a motor car than other vehicles, and the inevitable result, it is claimed, will be that their present views will undergo a change.

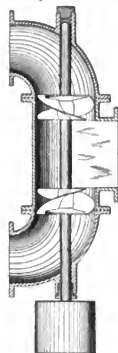
It has been calculated that the average of cubic inches per horse power of engine of the vehicles entered in the British Reliability Trials this year is 11.2, the highest being 26 and the lowest 6.3—surely a large difference. The average ratio of stroke to bore is 1.156. In two motors the bore is greater than the stroke.



United States Patents.

736,421. Pump.—E. T. Miles and Z. Storch, of Alameda, Cal. August 18, 1903. Filed February 17, 1902.

In practice it has been observed that in helical runner pumps a large proportion of the water is driven from the peripheral portion of the runner, and of this a very large percentage leaves the extreme education tip. Thus with a three bladed runner



No. 736,421.

the water is thrown off therefrom in three curved wedge shaped streams. In order to provide for this observed action of the water under the conditions referred to, a special form of runner is necessary to prevent internal circulation and cross currents within the body of the runner. The form herein-after described accomplishes this function and produces a very efficient pump.

Described generally, this invention consists of two or more helical runners or fluid impellers of peculiar form within a suitable casing, with the intake located in the centre of the device between the helical runners.

The intake portion of the blades of the runners is preferably made with a graduated pitch, increasing from the intake to the discharge at about the ratio of seventeen to twenty-five.

736,922. Steam Generator.—Frank M. Ashley, of Brooklyn, New York. August 25, 1903. Filed December 13, 1901.

738,167. Automobile Controlling Mechanism.—Geo. H. Day, of Hartford, Conn. September 8, 1903. Filed January 16, 1903.

A separate cut-out switch is inserted in the main circuit of an electric vehicle and is located near the brake pedal. When the brake pedal is depressed it engages an arm controlling this switch and thereby causes the switch to be opened before the brake is firmly applied.

737,686. Reversing Gear.—Carl W. Weiss, of New York, N. Y. September 1, 1903. Filed July 18, 1903.

737,652. Power Transmitter.—E. T. Mc-

Kaig, of Chicago, Ill. September 1, 1903. Filed January 26, 1903.

737,653. Power Transmitter.—E. T. McKaig, of Chicago, Ill. September 1, 1903. Filed March 23, 1903.

738,808. Roller Bearing.—John Hutchinson, Jackson, Mich. September 15, 1903. Filed February 12, 1903.

738,858. Exhaust Muffler.—George F. Swain, Harvey, Ill. September 15, 1903. Filed October 20, 1902.

738,907. Rotary Engine.—Henry L. Humphrey, Detroit, Mich. September 15, 1903. Filed May 16, 1903.

738,942. Storage Battery.—Frederick A. Redmon, Chicago, Ill. September 15, 1903. Filed March 16, 1903.

739,025. Inner Tube for Pneumatic Tires.—Theron R. Palmer, Jeannette, Pa. September 15, 1903. Filed April 14, 1903.

739,219. Explosive Engine.—John H. Redfield, Spokane, Wash. September 15, 1903. Filed April 30, 1902.

739,234. Pump.—Zdeny Storch, Alameda, Cal. September 15, 1903. Filed September 15, 1902.

739,293. Igniter for Gas Engines.—Peter P. G. Hall, Jr., Philadelphia, Pa. September 1, 1903. Filed December 22, 1902.

738,064. Vehicle Tire.—Adolf Prinzhorn, Hanover, Germany. September 1, 1903. Filed May 11, 1903.

737,737. Cooling Means for Gas Engines.—Charles F. Hitchcock, Oakland, Cal. September 1, 1903. Filed January 2, 1902.

737,745. Felly for Vehicle Wheels.—Rudolf Kronenberg, Ohligs, Germany. September 1, 1903. Filed February 17, 1903.

737,749. Drive Chain.—Christopher W. Levalley, Milwaukee, Wis. September 1, 1903. Filed June 25, 1902.

736,462. Variable Speed Gearing.—Frank L. Todd, Elyria, Ohio. August 18, 1903. Filed September 2, 1902.

736,517. Clutch.—Carl L. Grohmann, New York, N. Y. August 18, 1903. Filed April 24, 1903.

737,816. Elastic Tire for Vehicles.—Wilhelm Ballassa, Vienna, Austria-Hungary. September 1, 1903. Filed December 19, 1902.

737,675. Variable Speed Gear.—J. J. H. Sturmeijer, of Coventry, England. September 3, 1903. Filed March 10, 1902.

This invention relates to a three speed gear of the planetary type, in which the drive is direct on the intermediate gear. The gear is located within the driving wheel hub, the spindle A of which is hollow and stationary and provided with a pinion E. In the hollow spindle is fitted a sliding pin B for controlling the gear, the operating mechanism for the pin being as shown in the sketch.

On the pin B are mounted two keys. C, D, which project through slots cut in the spindle A, one on each side of the spur wheel E. Each key engages with an externally grooved collar, F, G, respectively, mounted loosely on the spindle A.

The sprocket H is secured to the outer

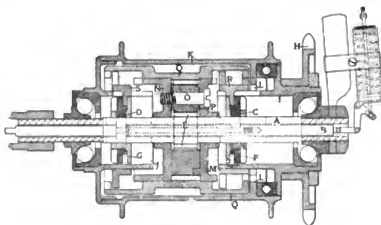
end of a hollow cylinder I, the inner end of which stops short of the middle of the hub. A second corresponding cylinder J is united by a suitable end piece to the corresponding end of the hub shell K, which carries the spoke flanges and always rotates with the second cylinder J. The end of the hub shell K nearer the sprocket wheel H has an inwardly directed flange L, and a ball bearing is provided between this end of the hub K and the cylinder I. The hub as a whole is supported on ball bearings introduced between the spindle A and the cylinders I and J respectively.

On the wheel spindle A are loosely mounted two annular plates, M N, one against each side of the spur wheel E. These annular plates are connected by, say, four transverse bolts O, on each of which is mounted a pinion P, gearing with the spur wheel E on the spindle. These pinions also gear with internal teeth provided in a sleeve Q introduced between the cylinder I and the hub shell K, and supported upon the annular plates M N.

Upon the cylinder I is mounted a ring R, having, say, four external projections or dogs on each part. The ring R is caused to rotate with the cylinder I by one or more internal projections on the ring passing through longitudinal slots in the cylinder, and these internal projections engage with the grooved collar F. A similar ring S, but having one set of dogs, is mounted on the cylinder J and is caused to rotate therewith by internal projections passing through slots cut therein, and these projections engage with the grooved collar G. The three sets of dogs are adapted to engage with notches formed on the outside of the annular plates M N in internal flanges on the ends of the sleeve Q and in the internal flange L in the hub shell K respectively.

The action is as follows: When the pin B in the spindle is moved from the position shown to the left the dogs on the ring S engage with the notches in the flange of the sleeve Q, the large dogs on the ring R engage with the notches in the plate M of the cage, and the smaller dogs on this ring are left free. The rotary motion of the sprocket wheel H and cylinder I is then transmitted through the ring R to the cage, and the pinions P rotating on their own axes, as well as around the axis of the spindle A, rotate the sleeve Q at a higher speed than the sprocket wheel H, and the hub shell K is made to rotate at the same augmented speed because the ring S causes the cylinder I and hub shell to rotate turn for turn with the sleeve. This gives the highest speed.

If the pin B be now pulled toward the right past the position shown into its middle position, the smaller dogs on the ring R will engage with the notches in the internal flange in the hub shell K, and all the other dogs will be free. Rotary motion is now transmitted from the sprocket wheel H and cylinder I through the ring R directly to the hub K, and the intermediate speed is



No. 737,675.

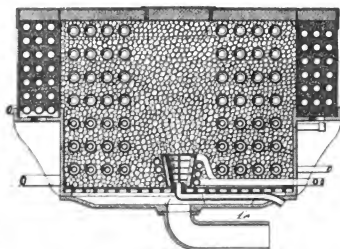
obtained. To obtain the low speed the pin B is pulled farther toward the right, when the dogs on the ring S will engage the plate N of the cage, the large dogs on the ring R will engage the notches in the internal flange of the sleeve, and the small dogs on the ring will again be free, having passed through the notches. The rotary motion of the sprocket ring H and the cylinder I is now transmitted through the ring R to the sleeve Q, and the plates M N of the cage are driven by this sleeve through the pinions P and the bolts O, the pinions rotating on their axes, as well as around the spindle A, and the hub shell K is made to rotate at this reduced speed because the ring S by engaging with the plate N now causes the cylinder J and the hub shell to rotate turn for turn with the plate and cage.

737,279. Steam Generator.—Chas. F. Ruby, of St. Louis, Mo. August 25, 1903. Filed June 16, 1902.

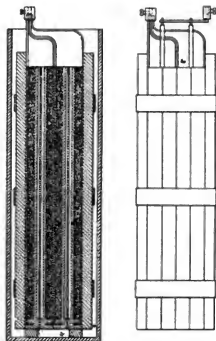
It has been customary heretofore in the use of steam generators of the flash type to mix the generated gas with air in a mixing device and then burn the mixture in air. The pressure of combustion in such a burner arrangement is practically nil, and the products of combustion escape through the paths of least resistance. In order to force the products of combustion to escape through the chimney under all conditions in the type of generator under consideration, it has been necessary to use the exhaust steam or some mechanical appliance to form a partial vacuum in the passage provided for the escape of the products of combustion. In such boiler furnaces the water heating surface exposed to the gases was limited, as with the attenuation of the water or the increased amount of heating surface the resistance of the sur-

face to the passage of the products of combustion was proportionately increased, and also the cooling effect of the large boiler heating surface had a tendency to cool the combustible gases to such an extent that combustion could not take place, and a considerable amount of unconsumed gases escaped. For these reasons the capacity of such a boiler was limited.

It is obvious that to absorb the greater part of the heat generated by combustion the heated surface must be exceedingly large, as the lower the temperature of the products of combustion the slower will be the absorption of the heat units by the boiler heating surface. In this invention the velocity of the incoming gas is utilized not only to effect a mixture with the air but also to produce pressure in the combustion chamber, which pressure admits of locating the point of escape of the products of combustion wherever desired. In order to prevent the mixture of the products of combustion with fresh incoming gases refractory material is arranged in the combustion chamber, which practically restricts the zone of combustion to a point approximate to the burner, and depending upon the amount of gas admitted and the pressure of said gas. The heat generated by combustion is, partly by conductivity, imparted to the refractory material in the



No. 737,279.



No. 736.420.

combustion chamber above or adjacent to the zone of combustion, which other refractory material also lies in the path of the heated products of combustion.

Another object of the invention is to provide means whereby the tendency of the water to spheroidal action is minimized, the water being generated into steam instantaneously.

737.602. Liquid Fuel Burner.—Hiram A. Frantz, Cherryville, Pa. September 1, 1903. Filed October 3, 1902.

736.564. Driving Mechanism.—Christian Stollwerk, Aix-la-Chapelle, Germany. August 18, 1903. Filed July 16, 1901.

736.584. Pneumatic Tire.—William Corliss, Providence, R. I. August 18, 1903. Filed February 9, 1900.

737.702. Tire.—Edwin B. Cadwell, New York, N. Y. September 1, 1903. Filed March 14, 1902.

737.399. Controlling Device for Automobiles.—Chas. B. Grout, of Orange, Mass. August 25, 1903. Filed February 11, 1903.

Relates to the arrangement of operating or control devices on a steam car. The car is provided with wheel steering, and the throttle valve is opened and closed by

sliding a sleeve developed in the form of a hand wheel up and down the steering post. Foot levers are located on each side of the steering post, one for operating the reversing gear and the other for operating the brake. The brake pedal is connected to the throttle mechanism by a ratchet device which insures the power being applied before the brake is applied.

736.420. Secondary Battery.—Joseph Middleby, Jr., of Malden, Mass. August 18, 1903. Filed November 22, 1899.

The object of the invention is to provide a secondary battery in which negative pole electrodes of metallic zinc may be employed without being subject to the usual objections to such electrodes, to which end a porous separator is interposed between the alternating, positive and negative electrodes of the battery, so constructed as to envelop and inclose one or both of the adjacent electrodes in such manner as to prevent any possibility of a growth of deposited metal from one electrode to another, but without injuriously interfering with the passage of the electric current or the circulation of the electrolyte. The integrity of the zinc electrodes is preserved by so protecting certain portions thereof that no substantial quantity of metallic zinc will either be dissolved from such portions during discharge or deposited thereon during recharge, thereby confining the chemical action on those electrodes to certain definite and restricted areas thereof and concentrating such action thereon. In this manner the chemical action is made practically uniform over the exposed areas during both discharge and recharge, while a conducting and strengthening framework permanently connecting such areas is preserved.

737.048. Cooling Device for Explosive Engines.—Richard J. Voss, of Davenport, Iowa. August 25, 1903. Filed April 6, 1903.

736.457. Crank and Crank Connection.—Thomas L. Sturtevant, of Quincy, and Thomas Joseph Sturtevant, of Wellesley, Mass. August 18, 1903. Filed February 25, 1903.

736.438. Engine.—J. J. E. Philips, of New York, N. Y. August 18, 1903. Filed March 26, 1903.

736.459. Vehicle Driving Mechanism.—Paul Synnestvedt, of Glen View, Ill. August 18, 1903. Filed December 23, 1901.

Exhibitors at Boston Carriage Show.

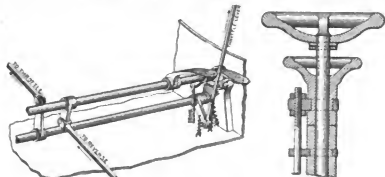
The thirty-first annual show of the Carriage Builders' National Association opened at Boston on September 21. Following is a list of exhibitors who exhibit automobile parts and sundries:

Peters & Herron Dash Company, Columbus, Ohio; Westinghouse Electric and Manufacturing Company, Pittsburg, Pa.; Lee & Porter, Dowagiac, Mich.; Diamond Rubber Company, Akron, Ohio; Schubert Brothers Gear Company, Oneida, N. Y.; Metal Stamping Company, New York; Hartford Rubber Works Company, Hartford, Conn.; Morgan & Wright, Chicago, Ill.; Goodyear Tire and Rubber Company, Akron, Ohio; Timken Roller Bearing Axle Company, Canton, Ohio; Wm. & Harvey Rowland, Frankford, Pa.; Muncie Wheel and Jobbing Company, Muncie, Ind.; Consolidated Rubber Company, New York; Richmond Manufacturing Company, Richmond, Ind.; Sheldon Axle Company, Wilkesbarre, Pa.; Jackson Cushion Spring Company, Jackson, Mich.; International A. & V. Tire Company, Milltown, N. J.; Gray & Davis, Amesbury, Mass.; English & Merick Company, New Haven, Conn.; Imperial Wheel Company, Flint, Mich.; Staples & Hanford Company, Newburgh, N. Y.; B. F. Goodrich Company, Akron, Ohio; Weston Mott Company, Utica, N. Y.; Fawkes Rubber Company, Denver, Col.; Moffett Vehicle Bearing Company, Saginaw, Mich.

A. C. of Buffalo Fetes Governor.

While at Buffalo last week Governor B. B. Odell, of New York State, was fêted by the A. C. of Buffalo. The program of the Governor's sojourn included a visit to the Hamburg fair on Friday, September 11, where he was taken by members of the club, riding on the outward journey in the vehicle of William H. Hotchkiss, president of the club, who drives a Packard car. The other members in the procession were Dr. Truman J. Martin (Packard), P. P. Pierce (Arrow), H. C. Wilcox (Cadillac), W. C. Jaynes (Winton) and Secretary F. J. Wagner (Franklin). The procession started from Engle street and went down Main street to Swan street, and out through the south side to the open country road to the fair. Just outside of Hamburg a tire on Mr. Hotchkiss' car became punctured, and as the Governor was in a hurry he transferred to Mr. Pierce's car, which took him to his destination at a good rate of speed. This is said to have been the first extensive auto ride the Governor has taken and his comment was, "I enjoyed it."

Le Monde Sportif announces its intention of organizing a race from Paris to St. Petersburg in 1904. Where no permits for racing can be obtained the regulation speed limit is to be observed.



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...EVERY WEDNESDAY...

Devoted to
Motor
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The Endurance Contest.

Now that the list of entries has been made public, one may form a fair idea of what the coming endurance contest will be like—at the start. The total number of entries is forty-one, or about 50 per cent. of the entries last year. This small number might be taken as an indication of a retrograde movement in the automobile industry, but there are other good reasons why the list is not larger, and few of those familiar with the conditions of affairs expected a larger entry list.

Reference to the tables published in this issue will show that vehicles are entered by twenty-one firms—gasoline vehicles by twenty and steam vehicles by one only. Last year there were thirty-eight different makes of cars in the contest, thirty gasoline and eight steam. Seventeen makes of gasoline cars, including five foreign, which were represented in last year's contest, will not compete this year, but seven new makes have been entered. Of the eight makes of steam cars which ran last year only one will compete this year, and there are no new competitors of this class. The reduction in the number of entries is therefore due to the abstention of (1) nearly all steam car manufacturers, (2) all foreign manufacturers, and (3) a considerable number of the gasoline manufacturers who competed in last year's run.

Considering that steam cars in general have always been very successful in endurance runs, one might feel inclined to ascribe their absence in the present contest to an unfairness of the rules to the steam vehicle. In fact, the rules are somewhat less favorable to the light steam car than were those of last year's contest, not allowing for a renewal of the supplies en route without penalizing the stop, so that only steam cars with condensers could possibly make a perfect run. Yet the final classing will depend upon so many factors that the points lost in this manner would

not affect it greatly. A more plausible explanation of the withholding of the steam element is that the market for light steam cars (flash steamers excepted) has almost completely vanished.

That there would be no foreign machines in these trials was predicted in these columns several weeks ago. The foreign machines have never been particularly strong in point of endurance, to judge from their performance in previous contests, and, besides, one would hardly expect foreign manufacturers or agents to enter a contest controlled solely by American manufacturers. At least, this will serve as a good excuse.

That so many gasoline car manufacturers failed to enter is due to a number of causes. The Licensed Association may have had an influence in this respect, yet of the twenty entrants of gasoline cars only fourteen are members of the Licensed Association, and only half the members of the Licensed Association are therefore represented. Some of the members are not in position to enter such a contest; a few well established makers have been decidedly unfortunate in former contests, and do not seem to take much interest in endurance competitions, while some others, owing to the attractive prices and high reputation of their goods, have all the orders they can fill, and probably refrained from entering for this reason.

These, we believe, are the reasons why there are only half as many entries as last year. Perhaps still another reason may account for the seeming lack of interest of the industry in the event. The smallness of the entry list is particularly apparent when compared with the large number of entries in the English trials—140. The British automobile market is certainly considerably smaller than the American market, and the British industry incomparably smaller than the American industry on the basis of volume of output. What, then, is

the reason why the entries in the British contest exceed those in the American contest by over 200 per cent? The only apparent difference between the two contests is that one is conducted by a national body of automobilists and the other by a national manufacturers' association. It is to be doubted whether the public will show the same confidence in a contest controlled by manufacturers as they would in one organized and managed by a body consisting chiefly of private-users. There is every indication that the contest will be a very severe one and absolutely fair, yet the interested prospective purchaser will consider the results in the light of the reflection that the contest was controlled absolutely by the manufacturers' association, its officials and employees. The advantage of having an independent users' association participate in the organization of the contest was acknowledged by the N. A. A. M. when it invited the co-operation of the A. A. A., and it seems rather a mistake to have taken the matter of contest organization out of the hands of the A. C. A. before the co-operation of the A. A. A. was secured, for the contest would certainly have been strengthened by the co-operation of America's most important club.

Although the total number of entries is small, nearly all the larger and older firms are represented, and, as the conditions are severe and the tests afford considerable variety, the event should prove of unusual interest. Besides, as most of the machines entered are of established reputation, a good general showing may be expected.

Entry Fees as Guarantee of Good Faith.

In connection with the eliminating trials for the Gordon Bennett Cup race it has been found necessary, particularly in England and Germany, to demand very large entrance fees or deposits, to be forfeited in case of non-appearance of the entrant at the start, to insure the good faith of entrants. Entry for an event of so much popular interest as an international speed contest carries with it so much free advertising that there is a strong temptation to go through the entry formalities and pay the entry fee without any intention of building vehicles for the contest. In connection with endurance contests abroad it has also become necessary to require the payment of a forfeit sum at the time of entry. It occurs to us that the entry fee for the coming endurance run to Pittsburgh

might well have been set at a higher figure, with the provision that a fraction of the fee would be returned to entrants who actually started or who accomplished a certain portion of the run. As it is there will undoubtedly be some absentees on the morning of the start.

Anti-Speeding Convention.

The German Automobile Club is promoting an international convention to devise ways and means for dealing with the problem of reckless driving. This move is of interest more particularly for the reason that thereby another leading automobile organization acknowledges that dangerous speeding is habitually indulged in by some drivers, and goes on record as opposed to it.

This attitude of a representative automobile organization is to be commended, and the announcement of the convention idea has been very favorably received by the public press. By assuming an attitude of opposition to reckless driving, automobile clubs will certainly enhance their influence with legislative bodies for the enactment of reasonable speed legislation.

Whether dangerous speeding can be materially reduced by resolutions adopted by a convention is to be doubted, however. Resolutions against speeding have repeatedly been adopted by national and local clubs, but the sequence has always shown that it is one thing to pass such resolutions and quite another to enforce them. The only means of checking scorching on the public roads is to deprive speed of some of its temptations. This could be accomplished by suppressing organized racing, but this drastic measure we do not expect to see recommended by any international convention at present.

Increase in Rubber Prices.

According to an article in the *Gummi-zeitung*, the organ of the German rubber trade, there has been an increase of 33 per cent. in the price of crude rubber since last fall, which will probably lead to a general increase in the prices of rubber tires. A number of British tire makers have already issued new price lists, and two or three French manufacturers are also said to be contemplating an advance in price for the 1904 season. In addition to the increase in the price of crude rubber, cotton fabric has also been very high during recent months, probably on account of the at-

tempted corner in cotton. The general advance in the price of raw materials may have a tendency to reduce the quality of tires, yet the way in which all the large tire firms have been trying to live up to their guarantees and protect the reputation of their goods offers assurance that no sacrifice will be made in this respect. This increase in the price of raw materials was undoubtedly one of the causes which led to the agreement between American tire manufacturers respecting sizes to be used, rims, etc., as announced in a recent issue of *THE HORSELESS AGE*.

Motorphobia.

Fanatical opposition to the automobile is on the whole very rare in this country. The metropolitan dailies occasionally print strong editorials denouncing speed excesses and careless driving, but the whole press is practically unanimous in recognizing the automobile as a legitimate pleasure vehicle and as destined to a great future in the commercial world. Unfortunately the newspapers have rather frequent occasion to report cases of furious driving, but most of them are fair minded enough not to hold the entire automobile world responsible for the offenses of the few nor condemn automobilism outright because some exceptional automobilists are in the habit of driving to the common danger. The widely circulated and influential publications usually take a broad view of such matters, and the motorphobic articles which occasionally meet our eye generally originate in country papers. We believe the rural population is no less friendly to the automobile than the city people, but think that the cause of the occasional outbursts of country papers is due to the narrow-mindedness of their editors, who base their views upon isolated experiences of their own or their neighbors and generalize upon too slender data.

Long tirades against the automobile may occasionally be read in a paper published in Laconia, N. H., which only recently again delivered itself of an epistle of this kind. The immediate cause of the article was that a horse driven by a farmer's boy was scared by a passing automobile and became unruly, without doing any damage, however.

The machine is said to have run as fast as a train of cars, and when it swung into the road only two wheels touched the ground—according to the story of the boy, who is said not to be a liar. He would

seem to have an inclination toward exaggeration, however. Further on the same paper refers to automobiles as "the most damnable vehicles that the ingenuity of men ever contrived and constructed."

It is, of course, unfortunate that horse drivers in districts little frequented by automobiles should be so much annoyed by the advent of the new vehicle, but all progress is accompanied by obstacles and annoyances, and cursing progress will not stem its tide. The automobile has as much right to the road as the horse, and will continue to grow in popularity in spite of the fact that some horses shy at it. Farmers should bear this in mind and take advantage of every opportunity to educate their animals to the machines, and country papers should advise them to embrace these opportunities, instead of trying to incite their animosity toward the new vehicles and their drivers. It is of great importance to all concerned that friendly relations be maintained between the different classes of road users.

Economy of Motor Bicycles.

It seems recently to have occurred to the champions of the motor bicycle that a good method of calling attention to its economic features is to hold fuel consumption contests. A motor bicycle fuel contest was a feature of the recent Brighton Beach track meet, and a similar competition was also held recently in France under the name of Criterium du Quart de Litre, each machine in this event being supplied with one-quarter litre of fuel.

In the fuel competition on the Brighton Beach track the winning machine covered just short of 20 miles on a pint of gasoline, which is equivalent to 160 miles on a gallon. It is true that this record was established on a smooth track and under conditions of continuous running, but as a motor bicycle has only one speed gear the consumption could not be very much greater under ordinary road conditions, so that it will be admitted that the fuel cost of the motor bicycles is almost negligible.

In point of reliability, too, much progress has been made, as the long distance contests of this summer, both in this country and abroad, have proved. The only thing which now seems to retard the popularization of the motor wheel is its danger on wet roads, its want of comfort and the strains to which it puts the rider, and the

efforts of motor bicycle designers should be directed toward eliminating these defects as much as possible.

"Touring in America."

The instalment in the present issue is the last of this series. The season being so far advanced, the time of planning automobile tours is practically past, and, besides, all the most important touring districts in the country suitable for summer touring have been fairly well covered. During the winter months we shall have a number of articles on touring in Southern countries where wintry winds are unknown and where auto touring may be fully enjoyed when the North is snow and ice bound.

Calendar of Automobile Dates and Events.

- October 3.—Race Meet at Empire City Trotting Club, Yonkers, N. Y.
- October 4.—Paris Cab and Delivery Wagon Trials.
- October 7-15.—New York-Pittsburg Endurance Contest.
- October 10.—Race Meet of Automobile Club of Philadelphia.
- October 21.—Brighton Beach, New York, Race Meet.
- December 10-25.—Paris Automobile Exhibition.

Method of Proceeding in Case of Brake Failure.

By DR. HENRY POWELL.

Now that the Endurance Contest is upon us and bids fair to be a test of great severity, I would suggest that one or two points in the construction of the competing vehicles be made the subject of a preliminary test. I refer more particularly to the capacity of the brakes to hold the machines from running backward downhill in case they come to a stop for any reason. On the severe grades which will be encountered this matter will be of great importance, as a defect in one vehicle may easily result in injury, not to it and its occupants alone, but to other competitors who may be following it.

I have made a careful measurement of many of the steep grades in Northern New Jersey, and have never found a macadam road of greater pitch than 12 per cent. Even on such a grade it is no uncommon thing to see an automobile unable to stand the strain and move with more or less speed backward down the hill.

In many cases one side at least of the road is banked by an earth wall, and it is a matter of little difficulty to allow the rear wheels to run into the bank. In other cases, however, the road is built up above the level on both sides and the avoidance of an accident is difficult.

I have been in such a position more than once, and hit upon a plan of action in such cases which I have been able to

carry out with safety. The brakes being on and the carriage not having yet attained much speed, my method is to turn the steering wheels hard over in one or the other direction. The carriage promptly makes for the corresponding declivity. When as near that side of the road as is safe, throw the steering mechanism to the opposite extreme. The result is that with only a moderate width of road the carriage will come to rest at right angles with the road, and one has ample opportunity to dismount and make all necessary adjustments.

Brakes are apt to fail during sudden rains or when water has in any way been spilled upon the brake band. The result seems to be to form an emulsion of the small amount of oil which is properly on the brake drum and to reduce its factor of frictional resistance to a small fraction of the normal. Free and long continued wetting often has the opposite effect and causes brakes to hold with undue severity.

Test of Motor Truck.

In a test run made by one of the Fischer Motor Vehicle Company's 5 ton trucks to Morristown, N. J., the following results were obtained, according to the manufacturers:

The truck left the factory at Hoboken at 8:45 a. m. on September 18, running to Jersey City and arriving there at 9:15, where 4 tons and 2 cwt. of sash weights were loaded. The vehicle started on its way to Morristown at 11:05 and arrived there at 6:25 that evening. The total time lost on the various stops, including one hour for dinner, was one hour and thirty minutes, making the actual running time five hours and fifty minutes. The distance covered was 31½ miles, and 18 gallons of gasoline were consumed. The total ton miles for the trip amount to 129, and with gasoline at 12½ cents per gallon it would figure out 1¼ cents for fuel per ton mile for hauling the useful load.

In the course of this trip a number of long hills were encountered, one of them being about a mile long, and in some places these hills were very steep, up to 12 per cent.

The truck left Morristown on September 18 at 8:25 a. m. and arrived at Hoboken at 1:30 p. m. Twenty minutes for several stops is to be deducted from this time, which leaves four hours and thirty-five minutes as the actual running time for the return trip. Twelve and one-half gallons of gasoline were consumed.

According to latest advices the German A. C., in its search for a suitable course for the G. B. race next year, has abandoned the circuit near Homburg in the Taunus Mountains again on account of the numerous steep grades, and is once more directing its attention to Mecklenburg in the northern part of the empire.

Brakes.

(Paper presented to the Second International Automobile Congress by Count Henri De Sontis. Condensed.)

For a long time vehicle brakes were designed along empirical lines, but the speed which recent progress in automobiles has permitted to obtain has forced the manufacturers to change their methods in this respect. The ability of a vehicle to run fast necessitates the ability to stop quickly.

The retarding effort of different types of brake is still more or less unknown. From trials and experiments made it appears, however, that the best brakes are not able to give a retarding effect exceeding 600 pounds per ton, corresponding to a negative acceleration of about 10 feet per second per second, and in practice it is more advisable to figure on only 500 pounds per ton, corresponding to 8.3 feet per second per second of negative acceleration.

Applying these values to the case of a vehicle weighing 1 ton, traveling at a speed of 66 feet per second, or 45 miles per hour, we find from the formula

$$t = \frac{V}{a} \text{ and } d = \frac{V^2}{2a}$$

$$t = 8 \text{ seconds, and } d = 264 \text{ feet.}$$

It is evident that in case of sudden danger a stop in a distance of 264 feet is not sufficient. The stopping or braking devices must therefore be capable of exceeding 10 feet per second per second of negative acceleration, until now considered the maximum, in order to respond to the actual needs of automobile traffic. With this brake power a stop could be made in 220 feet, which is still very long.

However slow it may seem, such a stop can only be effected by subjecting the braking apparatus to considerable stresses. The diameter of the brake drum can hardly exceed one-half the diameter of the wheel. Supposing, therefore, a vehicle fitted with 32 inch wheels and 16 inch brake drums, running at the rate of 45 miles per hour, the energy of motion stored up in the vehicle, which must be absorbed by the two drums, would be

$$\frac{2000 \times 66^2}{32 \times 2} = \text{about } 136,000 \text{ foot pounds,}$$

or 68,000 foot pounds for each, not considering the stored up energy represented by the rotation of the four wheels.

On the other hand, admitting the retarding effort to be 600 pounds per ton, at a speed of 45 miles per hour the energy absorbed during the first second by the two brakes would be $600 \times 66 = 39,600$ foot pounds. Granting that the effort exerted by the driver on his pedal or lever is between 30 and 40 pounds, the problem for the designer takes substantially the following form: By means of an initial effort of 30 pounds, 39,600 foot pounds of energy must be absorbed at the brake drums without injuring the framework of the vehicle. The task is the more difficult for the reason that the driver—the source of energy—

is seated on a framework which is connected to the axle (on which the brakes are located) by means of springs, the flexion of which interferes with the transmission of the effort.

LOCATION OF BRAKES.

Owing to its high speed of rotation, the secondary shaft just ahead of the change gear is the part which would seem best adapted for the application of the braking effort. However, the majority of manufacturers do not place their brakes on this shaft, on account of the often occurring necessity of braking when this shaft is not connected to the differential gear, but apply the brake to the transmission, either between the change gear and the differential, or upon the differential itself. The only part of the transmission gear from which the brake may then benefit is the differential gear, which distributes the retarding effort between the two drivers and avoids skidding, at least theoretically.* There are two serious disadvantages in applying the brakes at this point: 1. The brake becomes useless in case of a break in the transmission organs between the brake and the wheels. 2. The arrangement results in enormous stresses on the transmission members, on account of the reversal of the effort transmitted by them.

However, the most elementary precautions and the government regulations impose the use of at least two brakes, one of which acts on the transmission. Some manufacturers place two on the transmission, one of which is not interconnected with the clutch operating mechanism and admits of using the retarding effect of the motor in conjunction with the brake action. The different types of brakes used on the transmission are the same as those used as hub brakes and those used in connection with planetary transmission gears.

WHEEL BRAKES.

The second or third brake* is naturally applied to the wheels. The first idea which occurred to the manufacturers was to apply it to the tire, but pneumatic tires did not admit of this arrangement. Aside from the tearing, bursting and puncturing in which the friction of the shoe on the tire would result, it must not be forgotten that there would be very little friction between the shoe and tire when the latter was wet.

The application of a brake shoe to the rim is no better. The tires are already subject to enormous heating when the car is in motion, and the friction of the brake shoe on a rim adjacent to the tire would result disastrously for the latter. It thus becomes necessary to apply the brake to a false rim secured to the wheel. There is very little variation in the methods of securing the brake drum. The drum is fixed to one of the flanges of the artillery hub by the bolts which draw the two flanges to-

gether, is maintained in place by the studs which hold the chain sprocket in place, or has a threaded joint on the hub.

The brake itself is supported on the axle, generally by means of a bracket fixed to the spring support or formed integral with it.

An objection frequently made to hub brakes is that they are difficult to adjust and that consequently they often cause skidding. This applies particularly to band or shoe brakes provided with a friction lining subject to considerable wear. However, skidding is not always due to poor adjustment of the brakes. Unevenness and slope of the road surface, unequal inflation of the tires, and unequal loading of the two drivers also have a tendency to produce skidding, which adjustment of the tires cannot overcome. The effect of poor adjustment may be minimized by connecting the two brakes by an arrangement which distributes the braking effort between them in suitable proportion, but can never be perfectly overcome. This arrangement generally consists of a balance lever, which is, however, only semi-satisfactory. The Eldin-Lagier compensator is an improvement on this balance lever, but it is to be desired that still better devices be found. Efforts in this direction have been made by the Paillard-Lemoine firm. In the device produced by this firm, which is based on the principle of the differential gear, the brake lever terminates in a toothed pinion which transmits the motion of the lever to two toothed sectors, each operating one of the brakes.

BRAKES ACTING ON THE GROUND.

The old wooden shoes of our forefathers have also found their partisans as emergency brakes for automobiles. Such a brake, reduced to the form of a wedge attached to a chain and thrown in place by hand once the vehicle has been brought to a stop, is capable of real service, but every time it is attempted to drop it under the wheel while in motion one runs the risk of seeing the vehicle pass over it. This does not apply to the device of the Société Générale du Frein de Sureté, which causes the stop by slipping a metal pad under the wheel, which offers a greater resistance to the ground than the tire tread. The pad is connected with the frame of the vehicle by a system of links and chains which force it to enter beneath the wheel and to remain there. This device, which transforms the car into a sleigh, has the advantage of not destroying the tires and of not requiring any effort of application, it being only necessary to trip it by means of a lever or a pedal.

Another similar system proposed is known under the name of anchor brake. It consists of a system of levers which have their point of support on small wheels running on the ground, by means of which the vehicle is raised from the ground. Only a trial of this apparatus can determine whether it is practical, and whether it is

* It is generally held that the transmission of the braking effort through the differential gear is the cause of skidding when one wheel travels on slippery ground.—En.

not more effective in plowing up the road than in braking the vehicle.

The stopping devices just referred to are not brakes, properly speaking, not stopping the vehicle by the direct diminution of the rotative speed of the wheels. The different devices which produce this action directly may be generally divided into two classes—band brakes and shoe or block brakes; the latter are really only a modification of the former.

BAND BRAKES.

The first band brakes constructed, such as are still being used on omnibuses and some cabs, consisted of a cable, first of hemp and later of steel, which eventually was fitted with wood blocks to increase the friction, wound once or several times around a drum. This is the principle of the capstan. One end of the rope is secured to a fixed point and the other to an operating device which in pulling on the cable draws it tight on the drum, and thereby transforms the energy stored up by the vehicle into heat. The cable had the disadvantages that it did not slacken when the vehicle stopped and that it wore out rapidly; it has been replaced by a strip of metal lined on the inside with a special felt (improperly named camel's hair), with wood blocks or with rivets of red copper which are thermally insulated from the supporting metal strip by asbestos washers. As originally applied, the band brake was effective only in one direction. The necessity of braking the backward motion of the car as well has led to the adoption of two windings in opposite directions, with a central fixed point. Band brakes have also been tried without any fixed point of the band, traction being exerted on the two ends of the band, as well as brakes in which either end of the band forms alternately the fixed end and the movable end.

EXTERNAL BRAKES.

Brakes referred to as block brakes, in which the band is replaced by two shoes or blocks, which may be regarded as segments of a band, seem to be in general favor. Sometimes these two segments are independent of each other, and are simultaneously approached to or removed from the brake drum by means of a lever or eccentric, in the same manner as the brake shoes of a railroad car. Sometimes the two segments are permanently connected to each other at one end, and are brought together or moved apart at the other end by the brake operating device. One of the most efficient devices for insuring the gradual action of the brake is that employed on the Hautier car. The free ends of the two blocks are brought together or moved apart by means of a stud with opposite threads (right and left) at its opposite ends. It is argued, however, that this method of operation is a little too slow for hub brakes.

INTERNAL BRAKES.

Whatever may be the method of operation adopted, the brakes rapidly become

heated, and in the majority of cases cease to be efficient when hot or when lubricated by greasy material thrown on to them. The desirability of protecting them against grease thrown off and against mud has led to placing them inside the drum, which then forms a protecting casing. The two blocks, or their free ends, are still moved apart by means of eccentrics or by a system of levers. A delicate point in connection with these brakes is to avoid friction between the blocks and the drum when the brake is not applied and heating of the drum when the brake is in use. It has been attempted to cool the drums by means of water, which is fed into the drum drop by drop, and is thus wasted. In some cases the brakes work entirely in oil, which seems to be a better solution of the problem.

As to friction of the blocks inside the drum, that is avoided in the Clement vehicles by means of a spring interposed between the support of the brake and the lower part of the blocks. A number of other manufacturers support the free ends of the blocks by means of rollers running on the inside of the drum.

Among different types of internal drum brakes should be mentioned that of Chenard & Walcker, which differs considerably from the general design of this type of brake. It consists essentially in two clutch cones placed opposite each other with their larger bases together and keyed on the secondary shaft, on which they may slide in an axial direction. One of these cones engages with a female cone on the motor shaft, thus forming the clutch, and the other with a female cone fixed to the vehicle frame, forming the brake.

INTERNAL AND EXTERNAL BRAKES.

The successive application of internal and external brakes has led to one being produced which is both external and internal—the Rassinier roller brake.* It consists of a sort of pry bar with two lateral projecting arms on which steel rollers are carried, these rollers running on the inside and outside of the brake drum surfaces respectively. The rollers increase the smoothness of action and are said to aid in carrying off the heat. Oil is constantly carried to the axes of the rollers from an oil cup. The brake is characterized by great durability and equal effectiveness for forward and reverse motion. Neither oil, grease nor mud will affect it.

In a trial of this brake on May 13 last a stop was made in 30 feet on a 5.5 per cent. down grade (Butte de Picardie) from an initial speed of 45 feet per second. This stop corresponds to a negative acceleration of 33 feet per second per second.

SPRAGS AND KINDRED DEVICES.

Equal effectiveness for backward motion as for forward motion seemed to have been the aim of the manufacturers who exhibited brakes at the 1902 Paris Show. This

tendency to make brakes double acting is the result of the more and more noticeable discarding of the sprag and similar devices for checking backward motion.

The sprag hardly fulfills its object. Often the vehicle makes a lateral motion, describes a circle around the point of the sprag as centre, or the sprag does not take hold. In all these cases the sprag is entirely ineffective. It has been attempted to partly overcome these objections by making the sprag of triangular form with one side forming a segment of a circle having its centre at the pivot point of the sprag. This latter side is provided with a number of points, one or more of which will always take hold.

Pawl and ratchet devices have also been used. This apparatus is generally preferred to the sprag, being more gradual in action, more efficient and less easily broken. It seems better to apply it to the wheels than to the differential, on account of the possibility of a break in the transmission between the brake and the wheels. Like the sprag, it requires a special operating device, which is not always easily placed.

Automobiles in the Real Estate Business.

It is quite likely that the automobile will become popular in the real estate and renting business for taking prospective customers to inspect properties. As a rule the practice is to issue orders to view, and to leave it to fate to determine whether anything more is heard of those who have presumably made use of them with an idea to business. The more progressive firms, it is said, would find it to their advantage to have a motor car at call, so that they could themselves, or by representative, take prospective purchasers or tenants to this or that property, and clinch matters on the spot. The exhilarating effects of motoring would, it is argued, tend to neutralize that vacillation which the agent has so frequently to contend with.

Novel Offense.

A German automobilist recently received from the police department at Fechenheim, near Frankfurt-on-Main, the following penal notice:

"On the 2d inst., shortly after 3 o'clock in the afternoon, you drove an automobile on the local public highway, when you allowed the vehicle to emit smoke which distributed noxious odors over the whole street. The offense is proved by Police Sergeant Sperrel. You are herewith condemned to a fine of 3 marks, in conformity with Section 2 W. W. of 13.11.01 and Section 361, 11 R. St. G. B., to be paid to the public treasury of this town, and to be commuted to one day's imprisonment in case the fine cannot be collected."

It is more than surprising that a country constable should have such a sensitive organ of scent.

* See HORSELESS AGE of January 15, 1902.

TOURING IN

AMERICA.

XII.—Eastern Massachusetts.

(Concluded.)

By C. H. GILLETTE.

Lowell is one of the principal manufacturing cities in Massachusetts. It is situated on the Merrimac River and has the great natural advantage of hydraulic power from the river, which falls 33 feet in its tides. While this source of power is used considerably, it is coming to be looked upon as antiquated, and steam is slowly, but surely, driving it out of use.

From Lowell follow the river road, which bends gradually to the right, through Tyngsboro to Nashua, N. H. Little's Station, a town through which you pass a few miles beyond Tyngsboro, is about 1 mile north of the New Hampshire and Massachusetts State line. Eight miles north of Nashua is Merrimac, and Manchester is 10 miles beyond that. Follow the river road all the way, passing through Reed's Ferry and Goff's Falls, and crossing the river to Manchester. From here on the road is practically straight ahead, there being only one road at all possible for an automobile, through Hookset and Suncook to Concord, crossing the river to the west side again just opposite Concord.

An interesting circular tour can be made from Boston by way of the Boston to Portland route as far as Salisbury, just beyond Newburyport. At Salisbury turn to the left through Merrimacport to Haverhill.

North of Haverhill, beyond beautiful little Lake Kenosha, just off the roadside, you come upon a granite monument which bears the inscription "Whittier's Birthplace." Just beyond this you cross a little bridge over Country Brook and after a short walk reach the house, quaint and old fashioned still. Here the Quaker poet was born. This house was built in 1688 by Thomas Whittier. A ramble through the rooms of this quaint old building recalls "Snowbound," "The Barefoot Boy," "Yankee Gypsies" and many other products of the genius of Whittier.

From Haverhill the road continues along the river to Lawrence, where the river road is left, and the road leading due west through Pelham is taken, which bends south a little at the latter place and then north about 4 miles beyond. This road meets the river again just opposite Nashua. After crossing the river you turn left and follow the west side, bearing gradually to the left with the river through Lowell, where you turn to the right away from the river through Bedford and Lexington to Boston. This route is approximately 120 miles.

A shorter circular route could be made by crossing the Merrimac River at Law-

rence and continuing southward through Andover, Stoneham, Somerville and Medford to Boston. This route is a trifle under 100 miles, and could be done comfortably in one day under, of course, auspicious weather conditions.

Upon a slight eminence in the town of Medford—a quaint little old New England town—about a mile from the town square, is the Craddock House, which was built in 1634 by the agents of Matthew Craddock, appointed by King Charles I as the first governor of Massachusetts Bay Colony. While it was built as the residence for Governor Craddock, he never occupied it, the reason being he laid down his authority in defiance of the crown and transferred the governorship to the colony.

There is an interesting route to Springfield by way of Worcester. To take this tour, you leave Boston by way of Beacon street and straight out past Chestnut Hill reservoir to Newton Center. After crossing the railroad, the road turns to the right and then into Washington street, through Newton Lower Falls and Wellesley, and through Natick to South Framingham.

The road passes from here to Framingham Center, where it turns sharply to the left through Northboro and Shrewsbury to Worcester. This part of the route from Boston, as far as Worcester, is a magnificent road. It is macadam all the way and in splendid condition. Moreover it is practically level, with the exception of a



TEDESCO CLUB GROUNDS AT SWAMPSCOTT.



WHITTIER'S BIRTHPLACE.

stretch between Southboro and Worcester, where there are slight rolling grades. You leave Worcester, by way of Main street and Webster square, through Leicester and Spencer. A little beyond West Brookfield is Lake Wickabogus.

Warren is but a few miles beyond. From Warren to Palmer, a distance of about 12 miles, the road is not so good. This is the only part of the entire route where the condition of the road is any whit below the best, but it soon improves, and is a good macadam road beyond Palmer into Springfield.

From Boston to Greenfield, by way of Fitchburg, is an excellent long route. It is about 85 miles in length. The roads are practicable the entire distance, ranging from fair to good, generally good. From Fitchburg to Greenfield, there is a stretch of poor and hilly road, between Turners Falls and Orange.

This route leaves Boston by way of Harvard Bridge through Harvard square, Cambridge, following the trolley cars through Arlington to Lexington. Here the road turns to the left through Arlington Heights and Concord to Maynard, where the road turns due west and runs through Bolton and northwesterly through Lancaster and Leominster to Fitchburg. There is a shorter though not so good a route from Concord to Leominster, which goes by way of Harvard Center, Ayres Junction and Lunenburg Station to Leominster. From Fitchburg the road follows the railroad for about 3 miles and then bears gradually to the left, and leaving the railroad, goes through Westmin-

ster, Gardner and Athol to Orange. From Orange to Turners Falls is a bad stretch of road, and very hilly for the first part of the way. But from Turners Falls to Greenfield the road improves and is rolling. At Turners Falls, follow the Connecticut River to a point a few miles beyond, and follow a short distance southward, where a road branches to the right into Greenfield.

There are many excellent tours to be made to points south of Boston. The road to New London, by way of Providence, is perhaps one of the best routes of any of these southern tours, with the exception of a stretch through Rhode Island. As far as Providence the road is excellent. It is very level the entire distance, and is a well kept macadam road, with practically no turns of any account to throw the tourist off the main highway. This is a stretch of road to speed along merrily at as fast a pace as the law will permit. It goes through Roxbury, Dedham, Walpole, Wrenham and Pawtucket to Providence.

From Providence there are two routes; one by way of Plainfield, Conn., and the other by way of Westerly, R. I. The former is not so good as the latter, although there is very little to choose between them. The former goes through Cranston, Mt. Vernon, Sterling, Conn.; Moosup and Plainfield, along the Quinebaug River, crossing the Shetucket River at Tatville and following it to Norwich. From here on the road keeps close to the west bank of the Thames River through Massapeag to New London. The part of

this route from Providence, as far as Plainfield, is but fair and somewhat hilly along the first part of it, and it is an ill kept dirt road. But from Plainfield to New London the road is sufficiently good to make good time.

The other route, from Providence to New London, by way of Westerly, R. I., is a trifle better. There are, however, two ways of making this trip: one by following the road north of Kingston, R. I., and the other by keeping fairly close to the shore line. Both ways are the same as far as Wickford Junction beyond East Greenwich, and up to this point the road is undoubtedly the best along this part of the route which is in Rhode Island. At Wickford Junction the inland route continues straight ahead through Kingston and Wood River Junction to Westerly. It is but a fair road, and has some grades which are made worse by the condition of the road. The better way (along the shore line) is to turn to the left at Wickford Junction to the shore, and then turn to the right southward through Bridge-town, passing Narragansett Pier on the northeast at Wakefield. It is but a mile or two along a fair road from this town to the Pier, where a passable road runs along the shore to Point Judith. Continuing from Wakefield, the main road runs through Perryville and Charlestown, south of Watchaug Pond, gradually bearing to the northeastward to Westerly. This latter shore route from Wickford Junction to Westerly is, as I said before, a little better than the inland route. It is without doubt the most popular road for auto-

mobilitists in Rhode Island today. But the roads are poor at the best, and there are some bad grades, but this unfortunately is the usual condition in Rhode Island.

Before I had toured extensively in Rhode Island I used to wonder why this State did not have an automobile speed law, but since traveling over a great many of its roads recently I have come to the conclusion that there are but a few miles over which an automobile can possibly travel at a greater rate than from 6 to 8 miles an hour with safety. This, of course, makes a speed law practically unnecessary.

This route from Boston to New London, particularly by way of the shore line, is a favorite means of reaching New York by way of New Haven along the southern Connecticut shore. But by far the best

River it becomes hilly and very poor. At Taunton the Taunton River is met and followed along the west bank as far as Somerset, where the river is crossed and the east bank followed to Fall River. From that city the shore line is followed, and at Tiverton the narrows between Sakonnet River and Taunton River is crossed to Newport Island and the shore line continued to Newport City.

If it were not for the fact that there are excellent automobile stations along the part of this route from Fall River to Newport, I would say that an automobilist had better not take this trip, for when he arrives at Newport his car will be pretty sure to need some repairs. If not the motor, the tires surely will.

From Boston to Plymouth there is a

Mayflower on Plymouth Rock will be to the everlasting fame of Massachusetts. Here, after having braved the elements in a cockleshell of a craft in search of the religious liberty which the period in England did not allow, they braved dangers which would have made the bravest quake. Not alone did they have to combat the natural condition of the soil but the Indians whose depredations time and again depleted their thin ranks.

Pilgrim Hall is one of the places of interest in Plymouth which everyone should visit. It was erected in 1824 by the Pilgrim Society. In 1888 it was remodeled by John S. Stickney, of Baltimore, Md. one of the vice presidents of the society, at his own expense. This hall contains famous paintings, illustrative of Pilgrim



"ON A SLIGHT EMINENCE IN MEDFORD IS CRADDOCK HOUSE."

and most popular route from Boston to New York is by way of Worcester and Springfield, thence southward through Hartford to New Haven. I have previously described the route from Boston to Springfield. From that city onward the route is good, especially in fair weather. There are some hills and some poor stretches of road, but this is to be expected almost anywhere.

Another route to a point south of Boston is one to Newport. This route runs through Hyde Park, Stoughton and Taunton to Fall River, where it skirts the shore line all the way to Newport. From Boston to Taunton the road, though a dirt one, is good and level. From Taunton, while still good, the topography of the country begins to roll, and beyond Fall

fairly good road, which can be extended along the shore line from Plymouth, branching to the westward at Sagamore and skirting Buzzard's Bay, or continuing straight ahead from Sagamore along the eastern shore of Barnstable peninsula. This route leaves Boston by way of Dorchester through Quincy and Shipman to Plymouth. As far as Quincy, the road is nearly all macadam, good and level. From this town onward, the road, while good practically all the rest of the way, is but a dirt road, and has very few level stretches, though no really bad hills.

Plymouth is the port of entry and capital of Plymouth County. It is hardly necessary to say wherein the fame of Plymouth lies—the name of our Pilgrim Fathers and their lauding in the little

history: "The Landing of the Pilgrims at Delit Haven," painted by Henry Sargent and presented by him to the society in 1834; Wier's "Embarkation of the Pilgrims" (a copy of the original at Washington, painted by Edgar Parker); "Embarkation from Plymouth, England," painted by an English artist and presented to the society by ex-Governor Alexander H. Rice. These paintings are the most famous of the collection in Pilgrim Hall. In addition there is a large number of portraits of famous Pilgrims and articles and curios brought over on the Mayflower. In Plymouth also is the national monument of the Forefathers. The cornerstone was laid August 2, 1859. The main pedestal was set up in 1869 and the heroic figure surmounting it was placed

in position in 1877. Eleven years later the monument was completed, and in the following year, on August 1, dedicated with impressive ceremonies. This monument was designed and built by Hammett Billings. It is a massive structure of granite, 81 feet high, quarried in the State of Maine. The pedestal is octagonal in form, with four small and four large faces. There are four buttresses projecting out from the pedestal, on each of which are statues emblematic of Mortality, Education, Law and Freedom. The colossal figure of Faith, 36 feet high, surmounts the whole. This monument was built at a cost of more than \$30,000, and was sculptured by Joseph Archie, a Spaniard of considerable repute and skill.

From Plymouth the road runs past Rocky Point and Cedar Hill Point to Sagamore, following close to the shore line. This road is not as good as from Boston to Plymouth, and, in fact, does not improve any as it goes along.

At Sagamore the shore road continues straight ahead through Sandwich as far as one desires to go. There also a road branches to the westward, following the railroad to the town of Buzzard's Bay, as far as Wood's Hole. At this town one can see Buzzard's Bay on one side of this neck of land, which on a map looks like a disjointed skeleton finger pointing westward along Long Island Sound. On the other side is Vineyard Sound, beyond which is the island of Martha's Vineyard.

There is another route running from Buzzard's Bay along the north shore, and then along the west shore of Buzzard's Bay to New Bedford, where it branches due west to Fall River. But like most of the roads in this part of Massachusetts, it is not to be recommended for easy touring. The only point of vantage is the scenery which, especially along the shore line, is very impressive and beautiful.

There is a short route from Boston—about 25 miles—which, for anyone who wishes to make a day's run, is exceptionally beautiful. It runs to Cohasset just west of Strawberry Point. It follows the shore line of Boston Bay for the entire distance. The road, except for a short stretch, is macadam and in excellent condition. There are no grades to speak of. Despite the fact that one could really do some good sightseeing along this road, it is a kind of trip that one wants to take leisurely, stopping here and there at the resorts along the bay shore.

THE END.

A tale is on its rounds of a party of motorists who were held up by the Bucks police, and pretended to be foreigners who "spoke not the English." They simply bowed and smiled effusively, while the driver silently beamed in response to the official suggestion of a drive to the police station. Eventually the baffled trappers allowed the car to proceed, as an easy solution of the linguistic difficulty.—*Autocar*.

LESSONS OF THE ROAD

Diary Notes of a User.

By * * *

One glorious Sunday morning I accepted an invitation to drive with a friend to a lake resort about 60 miles distant. His machine was a powerful touring car of popular make and I anticipated a splendid trip. We were soon on the road with full tanks and everything apparently working finely.

I have a habit, born of long and sad experience, of keeping a very close watch upon the parts of the machine which are in view. This interferes somewhat with a full appreciation of the landscape, but it sometimes enables trouble to be detected early, before it has developed to the dangerous stage.

After we had bowed along merrily for a time I happened to notice that the bolt which passed through the centre of the front spring leaves on my side was loose, and almost before I could report it to the operator the bolt had dropped out. A halt was made to investigate the situation, and it was found that every leaf of that spring was broken squarely across through the bolt hole. The most we could do was to tighten the two clips which were fitted to the spring leaves, one on each side of the axle. This was done very carefully, and we proceeded slowly to the next village to search for a blacksmith.

A casual glance at the other front spring showed one of the leaves also broken, and the cause of these breakages at once became apparent when we investigated the clips. It was found that they were loose and allowed of a certain amount of vertical play of the leaves. As the centre bolt was tight all the strain on the leaves was concentrated at that point, which unfortunately was the weakest point of the leaves, owing to the reduction of the cross section by the bolt hole. It was no wonder that the bolt at last gave way.

We were fain to put down in our book of automobile maxims: "Keep the nuts of your spring clips tight."

It seems as if there ought to be some other and better method of maintaining the proper relative positions of the spring and the axle than one which necessitates the drilling and consequent weakening of each leaf.

On arriving at the village we made a futile search for a blacksmith who might effect at least a temporary repair. One of them had gone to the city, and the other one, whom we found at home, was seized with sudden religious scruples against working on the Sabbath day, and, as we did not propose to offer the desired pecuniary inducements, we proceeded rather lamely for a town about 12 miles distant, where there was said to be a blacksmith

who was not over particular about the day of the week.

The broken spring was in bad shape, as the clips were unable to hold the broken ends of the leaves from working relatively to one another. The pieces would move up and down and would finally slip out of the clips. By pulling out the two parts of one of the broken leaves and passing them through both clips, one above and the other below the other broken plates, and frequently tightening the clip nuts, we managed to reach the blacksmith's shop. Fortunately he happened to have some steel of exactly the dimensions of our broken leaves, and while we were partaking of a good dinner he forged out a new set and welded a part of the old ones.

The new leaves were soon in place, and when we asked for the bill, expecting a good round charge for Sunday work, he replied, "Oh, give me whatever you think it is worth." This reminded us of an official repair shop, "because it was so different." The charge was left to me as a disinterested party, and, after a mental computation of stock and labor at 50 cents per hour, I named what I considered a modest figure, which was cheerfully accepted, with the remark "That's about twice what I was going to charge you." I think our friend must be the original of Longfellow's honest blacksmith, "under a spreading chestnut tree." May he long remain uncontaminated by contact with "experts"!

After taking leave of the crowd of spectators with which the shop was congested, my friend started to back out, but miscalculated his clearance and caught one of the front hubs on the door post, wrenching the wheels badly out of parallelism. We thought we were in for a long job of heating and straightening, but our friend the smith fortunately discovered that our steering knuckles and the steering pivots were separate and held together by friction only and that the parts had not been bent, but only misplaced. He soon had us in condition again. After a cheer "so long" to the crowd we made another start.

"So long" proved to be about 30 feet, when the motor stopped with a despairing grunt and refused to be energized again. As the difficulty seemed to be one of ignition, the battery connections were scrutinized. They seemed to be very substantial and perfect, as the wires were inserted into copper battery terminals that seemed to offer a fine connection. Upon fingering one of these the wire fell out of the connection, and we realized that these terminals may be "fair without, but inwardly full of all uncleanness." The man who connected them had evidently used acid instead of the much safer paste when doing the soldering, and the wire had entirely corroded off within the shank of the terminal, without showing any sign of its defective condition.

Again we bade our friends a fond farewell and made a fresh start, only to stop after a few hundred feet. It was another

case of a corroded wire terminal, which had been jarred out of connection through the batteries not having been tightly packed. At last we were fairly on the road, with everything running well, when the rain, which had considerably held off while we were under cover, began to descend in torrents. We submitted to the rulings of Providence, and I left my friend to the enjoyment of the local hotel while I made my way back to the city.

A few days after I received a telephone from my friend saying that he was in trouble. It required only a cursory examination to diagnose the trouble as lack of cylinder lubrication. I never saw an engine "set" more securely. By taking out the spark plugs and pouring in cylinder oil in liberal quantities, all three cylinders were soon "limbered up" to a usable degree, and then the cause of the difficulty was sought. The cylinders are lubricated by means of a belt driven, force feed mechanical oiler, and, as I had always regarded such a device as almost "as sure as death and taxes," it did not at first fall under suspicion; but as all the oil pipes seemed to be free and the explosion checks in the sides of the cylinders seemed to be all right, the magazine oiler was at last detached and examined. It was thoroughly washed out with kerosene, and in the process two steel balls were found in the bottom of the magazine. We wondered what these balls were doing in so unusual a situation, but supposed they were "extras" thrown in through the liberality of the garage people. Upon testing the oiler it was found that two of the small cam actuated plunger pumps failed to throw oil, so that two of the cylinders enjoyed no lubrication save what arose from the splash. After a while it occurred to us that a steel ball was sometimes employed as the check in a check valve, and when the valves of two of the pumps were opened it was found that they were of this type and that the ball was missing in each case. These pumps had simply been drawing the oil from the magazine on the up stroke and forcing it back there on the down stroke, with no useful result.

When the balls were replaced in their valves the device worked perfectly. At some time the lubricator must have been dissected by the storage station people, who were ignorant of the use of the balls and did not replace them properly.

After it was thoroughly "limbered up" the machine ran so well that we decided to take a trip to a famous preserve of large game about 18 miles distant. The approach thereto was positively the worst road which I ever traversed, being full of springy portions which formed veritable sloughs of despond, upon the side of a very steep hill. On one or two occasions the drivers slipped in the greasy mud, and it was interesting to see the rear tires convert into steam the muddy water which covered them as they spun around. A slight push was sufficient to start the car out of the

holes. A fine view was enjoyed from the summit, but no sight of the wild game, as automobiles are excluded from the park—a fact which was made known to us in a needlessly offensive manner by the attendant.

One of the rear casings of the detachable tires of my own car had passed its usefulness, and as a new one had been received I sent a man up with it to put it on, thinking it would be a matter of an hour or so. After about a half day's work he came back to me, saying that it was impossible to force the casing over the rim. As a matter of fact, it required three stout tiremen, with tire tools and pinch bars, to force that casing into place, and I believe that it never could have been accomplished on the road. It seems that rubber shrinks very materially after it leaves the vulcanizing mold and then stretches very considerably in use. At least, this is the explanation offered by the tire people.

One morning I went to the stable to start the car, but found that by no amount of endeavor could I secure an explosion. The ignition apparatus was tested and found to be in perfect condition; the carburetor was taken apart and the spraying nozzle found to be clear; the inlet valves were demonstrated to operate perfectly, and still there was never a puff. At last I happened to take a look at the air inlet of the carburetor, and lo! it was not there. It must have dropped off on the road, and it is rather remarkable that the engine kept on working without it, as its absence allowed the ingress of a very large proportion of air and must have resulted in a very weak mixture—certainly too weak to start upon.

A visit to the plumber's served to replace the lost fittings, and the engine started promptly after they were attached. Accordingly I started for a little trip downtown and had gone a few blocks when something unusual in the "feel" of the steering attracted my attention, and my horror was extreme when I observed one of the front wheels almost off its bearing. I believe that the suddenness of my stop would have insured me a prize in a braking contest, and luckily I brought the car to rest before the wheel actually came off. As I was all alone I found I could not force the wheel on again, but, as I was very near a carriage shop, it was an easy matter to secure a jack to put the wheel in place again. The wheel, with its conical roller bearing, is secured to its axle by a left hand nut, and the presumption is that the forward motion of the car will prevent this nut from working loose. Probably, however, the nut had become a little loose by the jar, and when I backed out of the stable it had turned off.

Such experiences tend to destroy one's nerve, even if they result as harmlessly as this particular one did. A set screw will be added to this nut at the earliest convenient season.

On the Saturday before Labor Day we started with the tonneau and "four up" for a summer resort about 57 miles distant. We made good time despite muddy roads, and on a long hill we passed, at good speed, a steam touring car of popular make, the owner of which was pumping frantically, as I find operators of his car very frequently have to do.

All went well for about 15 miles, when one of the rear tires was found to be deflated. While we were examining the defective windbag, our friend of the steamer came alongside and most courteously offered assistance. As I knew that my so called detachable tires would not detach without herculean efforts, I decided to run to a city 3 miles farther on and get it repaired. After arriving there the machine was left in charge of the tire man, and we ignominiously returned home by the trolley. Another good automobile maxim: "Always follow a trolley line, if practicable, when touring." Bright and early the next morning all four of us arrived via trolley at the storage station and started for the remainder of the trip, which was entirely uneventful and almost ideal.

The next day we made a short side trip of about 10 miles through a town that, if not known to fame through any other reason, ought to become notable for its hills. I had previously met with steep hills, but there were usually some level stretches between them. Here one hill began just at the point that its predecessor ended, and the ride was an alternation of low gear climbing and breathless coasts. This particular town lately passed an ordinance restricting the speed of motor vehicles to 4 miles per hour. An investigation showed, what is often the case, that this hostility toward automobiles resulted from the ungentlemanly and prejudicial conduct of one man, who had brought his machine there for the season.

Our homeward trip began very pleasantly, and we covered 27 miles almost before we knew it. Then a tire deflated and we were again laid up. Fortunately our trouble came to us just in front of the home of a friend of ours who is most hospitably inclined, and we were soon regaling ourselves upon the best coffee and doughnuts that the country produces.

Our tire proved to be in bad condition. The casing had split entirely across and we had no extra casing. Nothing but inner tubes! Nevertheless, we boldly attempted to make a temporary repair by means of a heavy leather strap and canvas wound tightly around the casing before inflation. When, after much hard work, the tire seemed to be in usable condition and we were ready to start, the motor refused to mot. I blush to explain the cause. We had been using gasoline to clean the rubber of the inner tube preparatory to patching, and had obtained it by placing a piece of waste in the air suction and depressing the carburetor float. The waste had been most insistently left in the air

pipe, and at the first suction stroke of the engine it had been drawn into the carburetor, from which it was extracted only after considerable effort.

After running about 3 miles I stopped to make a slight clutch adjustment, when one of the young lady passengers remarked in a spirit of encouragement, "How nicely that tire is holding up!" Before I could reach out my hand to "touch wood" a suspicious sizzling in the direction of the suspected tire warned me that it was again deflating. Had it not been for the deterrent influence of the lady passengers I am sure I should have consigned that particular tire and tires in general to a region where all rubber is "self vulcanizing," but it is far better to meet such little incidents with a smile.

We rode that defective tire deflated to the next town where a repair could be effected, and it is unnecessary to say that the ride was not a specially pleasant one to the passengers on the damaged side, nor was it good for the constitution of the inner tube. I claim that it is about time for my tire luck to change. If it does not do so soon there may not be many more instalments of the "Diary Notes of a User."

With the Overland Car Through Utah into Colorado.

(Communicated by the Packard Motor Car Company.)

The main range of the Wasatch Mountains was to be climbed from Tucker on to Soldier Summit. On July 7 the car had ascended about 2,000 feet from Salt Lake City to Tucker, but the ascent had been gradual. The start from Tucker was made at 7:45 o'clock on July 8, the cyclometer showing 1,441 and the barometer 23.88, indicating an elevation of 6,100 feet. The hills out of Tucker were severe. At 8:30 o'clock 54 miles had been covered, and the car climbed to an elevation of 6,870 (barometer 23.22), with many down grades sandwiched in between the climbs. Soon Soldier Summit was reached.

140 feet higher, and the divide of the Wasatch Range, where the barometer (22.85) showed almost exactly the same altitude as at the summits of the Sierra Nevada, namely 7,350. The car had risen 1,250 feet in one hour fifteen minutes, and the ground was rougher than in the Sierras and the climb less steady.

The gradient of the D. and R. G. Railway at Soldier Summit is said to be the steepest on any main line in the world—about 4 per cent. In the immediate vicinity of Soldier Summit is seen a unique mining plant, the only place in the world where "mineral wax" is found, which is used as the principal material for the recording cylinders of phonographs.

At 9:30 o'clock a rivulet was crossed narrow enough to step across, but forming a triangular gutter with hard but slimy sides, so that the car could not be rushed across without bumping things severely. It proved a twenty minute obstacle, as the rear wheels simply turned around in the trough until stones were dumped in. From this point to Colton a railway grade was followed, built by the U. P. Railroad Co. It extended for many miles and saved many grades, though the top was so narrow and the fills so high that steering had to be quite accurate. Near Colton the bank of this grade formed one side of an artificial fishpond, a sight somewhat surprising in these surroundings.

At Colton it was said that the Castle Valley road was absolutely impassable. Where the valley narrows down to a 20 foot passage between vertical cliffs, barely admitting the railroad and wagon trail beside it, it was said the wagon road portion had been washed out completely, and there was positively no way of getting through. The people of Price, later, agreed with J. J. Cramer, of Colton, whose advice to go by way of Soldier Canyon was followed, that it would have been absolutely impossible to have reached their town from the west in any other way. Instead of going 30 miles

southeast from Colton in a direct line, the route lay easterly for 34 miles and then back, at an acute angle, southwesterly for 20 miles through Soldier Canyon.

The very exit from Colton was so steep that the entire village population turned out to see the machine scale the height, and this was followed immediately by a succession of hills ranging up to 40 per cent., both up and down. The first 5 miles were said to be the worst, and on one hill the driving wheels spun a little on a firm clay footing when the flywheel momentum was clutched on, just from the steepness of the grade. The rest of the way had no such grades, but it was unceasingly rough. For about 20 miles after leaving the main railway the road followed a light rail, narrow gauge spur along the foot of the mountains which form the southern boundary of the Utah Reservation. Over this spur rock is carried by gravity to Colton from the Cayune quarries and timber from farther east in the mountains. Beyond this were met a freighter and his assistant with two four horse teams, each drawing two small wagon loads of "mineral rubber." The freighter, whose wife was along, was at first inclined to swear when his horses became a little unruly, but soft words and assistance soon made him friendly and communicative. "Never in his life would he have thought that he should meet one of them things on this road." He had thought they were for boulevards only. His own load was divided on two small wagons for each four horse team, so that he could take up one at a time over stiff grades. His ideas of motor cars were manifestly changed then and there.

As the tourists saw afterward, they were traveling on a broad branch between Castle Valley to the south and the cliffs leading up to the Uintah section to the north. This bench is called the Park; it affords some grazing, and here and there the footprints of cattle indicated that it was not entirely devoid of population, though all that was seen of human beings for 43



SOLDIER SUMMIT ON DIVIDE OF WASATCH RANGE, UTAH.



CLIFFS OF PALE CLAY SURROUNDING FLATS OF SAND.



ENTRANCE TO SOLDIER CANYON.

miles' were the freighters with the mineral rubber and two young men with a team hauling a load of lumber. Washouts across the track and the now familiar high ridge between the ruts became very numerous and annoying, but some of the oldest and deepest ravines had been bridged, not over their entire width but over the smaller gully that usually rent their flattened deepest portion. An observation at 2 o'clock p. m. gave cyclometer, 1,175½; barometer, 22.78, showing the altitude still to be 7,350 feet. While running along on this high bench or plateau a water leak was discovered. The short rubber hose connection between the water tank and radiator had been struck too often by the compensating rods connected with the front spring shackles (the arrangement to which the flexibility of the running gear is mainly due), and had finally given way—something which could never occur on civilized roads, but was bound to happen sooner or later in this ditch-jumping contest. A little rubber tape stopped the leak and as water was scarce the occupants felt relieved.

A little before 4 o'clock a house and a fence appeared on the left. It was Whitmore's ranch, the tourists had been told, and being the only habitation for many miles, there was no possibility of mistake. It was the signal that here they would find "the excellent stage road through Soldier Canyon to Price," as it had been described by somebody who perhaps was in a sarcastic vein. "You can tell it easy by the telephone poles"; and, surely, there were the telephone poles, short iron pipes, scant 2 inches in diameter, forming an approximately straight line, uphill and down dale, now close to the wagon track and again, refusing to follow its endless curvatures, shooting off across the rocks. The canyon did not look worse in any place than many other easier pieces of road or virgin soil. But it was, mostly because there was heavy and continuous traffic over it. During the afternoon and evening perhaps twenty-five freighters were met, mostly with four horse teams and heavy loads, all hauling goods from Price to the mining camps up north. This traffic day after day had worn the ruts very deep, but

had not touched the boulders in the middle, and unfortunately there was usually no room on either side of the track, which necessitated staying in it and overcoming the ridge and stones in the best way possible. On the right hand side there was an exceedingly rough, rocky slope of 60 to 90 degrees, and to the left an ugly torn up ravine, obstructed in many places with gigantic angular stones weighing tons and hundreds of tons. When freighters were sighted it was a question of reaching a turn out place before they passed it, or else of backing out a considerable distance. Luckily most of them were met farther down the canyon, where the passable area broadened more frequently.

After several unpleasant experiences with the boulders, resulting in stops to turn the rear axle back to its correct position, and also in a very slow pace so as to minimize the danger of breaking the chain or something else if the height of a ridge or stone were miscalculated, smaller stones were piled in the ruts on both sides of the obstruction in the middle and the car thus bodily lifted over the obstruction. Three miles negotiated in this manner consumed two hours, although the road was downhill nearly all the time. At 6:10 o'clock a descent of about 1,300 feet had been made, to an elevation of 6,000. Thereafter the canyon widened into rough flats, with sand and stones, hedged in by vertical crescent shaped clay banks. Immense ravines separated one flat from the next one lying terrace like beneath it, all of them surrounded by clay banks. The last few miles the road was somewhat better, and this was fortunate, as it was rapidly getting dark.

The car arrived at Price at 8:15 o'clock, cyclometer, 1,205½; gasoline consumption, 6 gallons for 63½ miles, mostly on the hill climbing gear. Those of the population who noticed the arrival at the late hour were utterly astonished, and the astonishment quickly changed into enthusiasm, as the people in this section of Utah have sporting blood in their veins. Shelter for the car was found in a friendly blacksmith's shop.

The hunt for gasoline in the morning after the hardest day of the journey lasted

till to 4 o'clock, when to gallons were bought. Citizens clamored for rides in the car, and compliance with the wish advanced the cyclometer 6½ miles, to 1,212. The water hose connection was mended by means of a piece of bicycle tire. It was noon then, and it was concluded to rest the balance of the day.

The tourists left Price at 6 a. m. on Friday, July 10. Breakfast was taken at Wellington, 6 miles down the narrow Price River Valley. Cliffs of pale clay surrounding flats of alkali sand with scant vegetation continued the conspicuous and characteristic feature of the landscape. Soon the trail left the river and led into genuine desert, but first traversed a district where large and small arroyos were nearly as frequent as at Lucin, and averaged larger in dimensions as well as steeper. In one of the larger gulches the first two yards at the climbing out place measured 32 degrees (23 inches rise to the yard, or about 63 per cent.), and the remaining 18 yards 7 degrees (over 10 inches to the yard, or 28 degrees). In no other place had the dead load of the car been reduced to facilitate the surmounting of a grade, and here, too, this expedient was avoided, but only barely. It required hard pulling on front wheels to overcome those first two yards of 63 per cent.

In the ravines, where the snow fell deep and late in winter and spring, scrub cedar thrives well. Crossing one of these a long suffering front axle radius rod—the lower left one—was fractured at the ball joint, and nothing could be done except to strap it to the rod above it so as to prevent further damage and rattling. The incident did not seem to affect the car then, though it was suspected it would in course of time, since the two braces on each side certainly were not placed there without distinct purpose, and the fracture proved a high stress which now would have to be absorbed in some other portion of the car's anatomy, probably the front axle and spring and the steering rods and knuckles.

So far the route had been at some distance from the Book Cliffs, all the time visible to the north. Approaching Woodside, a settlement and railway station on Price River, the tourists drew closer to this forbidding wall separating a rough but well watered plateau at its top from the desolate country underneath, which apart from a narrow strip along the river is fit only for winter grazing. Forging the river at Woodside proved more of an undertaking than had been expected. The river has a shallow, sandy bed, but the sand is shifty and treacherous to a heavy load. The car was driven across the watercourse without trouble, although the first attempt was unsuccessful, and brush and jacks were needed to back it for a new start. The work with jacks and brush would have to be done over a second time: time was precious if Green

River was to be reached that evening, and so, as a team of horses happened to be at work close by, the team was engaged to drag the car back from its false start. With the assistance of the motor this was accomplished with ease, and the car then shot forth unassisted along the proper course, crossed the river again and made for the brink without further difficulties. But at the brink the unexpected happened. Here there was a deep irrigation ditch, which had been roughly bridged, but the bridge had been washed away. While one of the occupants looked around in vain for another place where the ditch might be crossed and the levee on the other side of it scaled, the driver gathered the strewn about members of the bridge together, dumped them in the ditch and, as they were slimy round pieces of undressed timber, covered them with the strip of canvas carried along, and by one of the usual tours de force accomplished the passage.

The attempt to reach Green River by daylight failed signally, and the last two hours were traveled in perfect ignorance of what the country looked like save for the few rods on both sides of the trail where the kerosene oil headlight shed its feeble rays. All the rest was complete darkness.

At Woodside, Price River bores itself in between the Book Cliffs to the north and the equally precipitous cliffs of what is known on some maps as Beckwith's Plateau, to the south. Leaving the river the western edge of the plateau was followed, which is triangular and rises so abruptly out of the desert that it seems perfectly inaccessible. It was said that there were a few places along the northern edge of this plateau where cattle and men could climb to the table land at the top of the cliffs, but of this no indication was seen. At a temporary section house a gang of Italian railway laborers admired the car effusively, and the foreman gave valuable directions as to the course to pursue, mixed with warnings of the drift sand that would be encountered. Shortly thereafter the lamps were lit and the moon went behind the clouds, not to be seen again that evening except at rare intervals. The night was hot, but an extra supply of water had been laid in at the section house. Several rests were necessary, however, to keep the water from boiling away, for the going was all on the low gear, with no wind stirring and the motor frequently running fast, while the car progressed only slowly. At the sand fences along the railroad, which were hugged as closely as possible, the sand was heaped in drifts like snow, and the same was the case wherever the road curved around a hill. In many places the trail was concealed for short distances, and in trying to trace it the wheels often ploughed deeply through the movable mass.

Near Desert Station, where the east bound passenger train was waiting for the

west bound to pass on the main track, the engineer on the latter, speeding up toward the car, suddenly put all the brakes on and brought his train to a standstill. Having seen the headlight of the car, he had sensed danger of a head end collision, but soon discovered the innocent cause of his tribulation and sailed past. This train carried James W. Abbott, special agent of the Bureau of Public Road Inquiries (United States Department of Agriculture), who had specially gone to Green River to meet the transcontinental tourists, his interest in the expedition being due to the bearing it might have on the good roads movement in the West. He proceeded to Price, took a return train to Green River, and saw the tourists the next morning.

Within a few miles from Green River the road was plainly marked and much better, and the town was finally reached at 10:30 o'clock, but nearly everybody had gone to bed and it was impossible to get quarters for the machine. The camping outfit was for two only, and Messrs. Fetch and Allyn made their beds with the car, while Mr. Krarup stretched himself on top of a bed in a hospitable boarding house for railroad laborers.

It was 9 o'clock the next morning when the car was let down a steep incline to board the cable ferry across the river. The tourists had no illusions about the road to Thompson's Springs, the last place with a natural water supply on the way to Colorado. It was desert, pure and simple. At Solitude there were signs of activity. Twelve miles south of this shipping point the Colorado Fuel and Iron Company owns some manganese mines, whose product is hauled to Solitude by a traction engine and substantial trailers. The tracks measured only 7 or 8 inches. Everything at Solitude—a store, a cistern and some sheds—is due to this enterprise. The cistern affords drinking water for men and animals and is kept full by a pipe line from the water tank at the railway station, about half a mile away.

The rest of the way to Thompson's Springs was rough, but presented no other difficulties than those already familiar. The car progressed as directed, sometimes slowly and sometimes faster, according to the nature of the traveling surface. Within 6 miles from Thompson's a leaky water tank fed by a pipe line from the springs in that village was much appreciated by the birds of the desert, and at night probably by the few coyotes that find subsistence in the vicinity. The drippings from the tank furnished not only a needed potation, but also a refreshing shower bath for head, face and arms, being blown into a fine spray by a hot wind which at that moment was sweeping over the landscape.

Thompson's was entered at 3:15 o'clock, and at this point it was decided to wait till after sundown before continuing the journey toward Grand Junction, Col., 78 miles.

An Interview With James B. Dill Regarding His Trip to Maine.

In an interview with a representative of THE HORSELESS AGE, James B. Dill, the New York lawyer, who has just returned from an automobile trip into Maine, expressed himself as very enthusiastic over that section of the country as a field for automobile tours.

Mr. Dill declared that the country roads of Maine average much better than those of some of the States farther south, although the latter States are better provided with regular turnpikes. The hotels and inns, according to Mr. Dill, are not surpassed by those of any other section of the country.

Mr. Dill was accompanied by his two daughters and two chauffeurs, and the trip was made in three steamers, one loaded with spare tires, parts and supplies. Considerable difficulty in securing gasoline was experienced, and at times it was necessary to ship cans of this fuel to points along the route.



"THE ROAD FOLLOWED A LIGHT RAIL, NARROW GAUGE SPIRE ALONG THE FOOT OF THE MOUNTAINS."

COMMUNICATIONS.

A Stitch in Time.

Editor HORSELESS AGE:

It may not be a matter of common knowledge to automobilists that at the end of each trip of a steamship a certain portion of the machinery is overhauled, so that at the end of a month every part of the engine has been disconnected, carefully examined, and wherever there has been any indication of wear or heat adjustments have been made to correct the same. Similarly with locomotives; everything is carefully examined at the end of each run, and after being a month on the road they are sent to the shop and carefully overhauled.

In the designing of marine engines and locomotive machinery, the working parts are made from four to six times stronger than the theoretical strains require. Again, the space occupied is sufficient to avoid cramping, and free access can be had to all working parts even when in motion. All important parts are under the immediate eye of the engineer, and receive his constant attention. Even with these advantages it is not unusual for such engines to show defects.

In order to reduce weights to a minimum in automobile design, it is necessary for the parts to be made only twice or three times as strong as required by theoretical strains; the lack of space necessitates the crowding of the machinery together to such an extent that when running it is absolutely impossible to examine it. Consequently, it is inevitable that there will be breakdowns and hot bearings on an automobile engine much more frequently than on other classes of motive power.

If it be necessary to give such a thorough and careful examination to the machinery of steamships and locomotives, it is much more important to follow a similar course with automobiles. Further, steamship and locomotive machinery is only entrusted to men who are thoroughly experienced in the care of the same, and who are usually first class mechanics, whereas average automobile owners have no previous knowledge as to either point.

Before a new locomotive is put at work the engineer makes a thorough examination of it, and satisfies himself that his oil cups, pipes, etc., are clear. The owner of an automobile, before using it, should pursue a similar course or have this work done by a good mechanic who thoroughly understands this class of work. And before attempting to run the machine he should thoroughly acquaint himself with it, how to properly care for it, how to oil it, and how to make adjustments in case of wear. He should also familiarize himself with the electric gear, not only practically but theoretically. He should acquaint himself with every sound and peculiarity of the opera-

tion of his machine. Each motor has some marked characteristic of its own; some portion that will always require special attention. A thump, a squeak, or the smell of burning oil signifies that something is wrong, and under these circumstances the car should be stopped at once, and a careful search made for the defect. Usually by giving such matters early attention, a slight adjustment or an additional supply of oil and blacklead will remove the difficulty.

Even with the most careful attention by the most skillful operators, automobiles will balk at times. Mr. Winton, Mr. Duryea, and even Mr. Damon, have had their troubles. This being the case, it simply remains for the automobilist to choose as to whether he will make his principal repairs at home or on the road.

It may appear to a novice that these suggestions will be a great source of expense and bother, and that while other people will be liable to difficulties, he personally will escape, but if Mr. Winton, in the Irish races, could not start, it is safe to assume that operators less skilled will have their troubles as well. By following these suggestions, however, the dangers of a breakdown will be reduced to a minimum.

After having constructed several thousand automobiles, the manufacturer has doubtless provided in his design an efficient machine which leaves the factory in perfect order, so that by exercising a careful supervision from the beginning the machinery can be kept in good repair indefinitely. On the other hand, while most automobiles will stand considerable neglect for the first few months, after that time they become almost incapable of repair, and I believe that most of the complaints as to the negligence of manufacturers in construction are actually due to the neglect of the owners in operating. The writer of this article is in no way interested in the manufacture of automobiles, but is simply one of a mechanical turn who has had considerable experience both with marine engines and with locomotives, and also some experience with automobiles.

DUTCH.

Tiller Steering and Lameness of Fingers.

SEPTEMBER 22.

Editor HORSELESS AGE:

In a letter in your last issue Dr. Stahl calls attention to an injury of the fingers, due to tiller steering. In response to his request for reports of similar cases I send a short account of my own.

About two months ago, after a ride over rather rough roads with my tiller steered machine, I noticed great soreness at the base of my little finger, accompanied by pain on flexion and extension. Very soon there developed a peculiarity in the motions of the finger, which still persists. When being slowly extended it moves to a certain point, then suddenly jumps with a click to full extension; then when being flexed the same process is repeated, and

after reaching a certain point it jumps suddenly to full flexion. These motions for a while were quite painful, and in the early morning almost unbearable, but disappeared to a considerable degree after the finger was limbered up. I have now very little pain at any time except on awaking, when the first motions are painful. When the finger is in active use during the day I do not notice it. It is always somewhat worse after using my machine.

My diagnosis is an inflammatory enlargement on one of the flexor tendons of the little finger, and I see no reason why it should get well so long as I run an automobile steered by a tiller.

I am glad attention has been called to these injuries, and I hope Dr. Stahl's request for the facts will receive a prompt response from those similarly affected.

JOSEPH STOKES, M. D.

Twin Cylinder Crank Shafts.

St. Louis, Mo., September 24.

Editor HORSELESS AGE:

In a double cylinder gasoline engine with cylinders set side by side, which is the proper way of making the crank shaft—so the two pistons move in the same direction or so they move oppositely? What would be the result of making the crank each way? A.

[The cranks of twin cylinder engines are made both ways, with crank pins in line with each other and with crank pins opposite. With crank pins in line with each other about 25 per cent. can be saved in the weight of the flywheel, as the explosions come at equal intervals, but such engines vibrate considerably. American manufacturers prefer to make the crank pins opposite or at 180 degrees with each other, which insures better balance.—E.D.]

Incorrect Newspaper Report of Accident.

NORWOOD, MASS., September 24.

Editor HORSELESS AGE:

The reports of our accident on the 19th inst. in the Providence papers are not correct. Mrs. Harriott did not jump, but stood up in the front seat and the force of the blow from the ice cart, which struck the rear part of our auto, threw her over the front and under our carriage, and not under the ice cart. She came home on the auto on Wednesday afternoon rather sore, but O. K.

A. T. HARRIOTT.

Circulation Connections.

Editor HORSELESS AGE:

Should the cooling water from a gasoline engine be pumped into the top or bottom of a coil to obtain the best results?

J. C. TURNER.

[Into the top, as in cooling it has a natural tendency to descend and thus aids the circulation.—Ea.]

Automatic Reversal of Steam Engines.

Editor HORSELESS AGE:

I am a subscriber to your publication and an owner of a steam carriage. In your issue of September 16 I note an account of an accident which resulted fatally and which closes with these words:

"The accident was the result of opening the throttle suddenly in an effort to surmount the grade, while the link motion was in its extreme forward position. This caused the engine to reverse, as has frequently happened with steam machines

[The automatic reversal of the engine can only be due to a reaction of the steam pressure in the steam chest on the link motion. The sketch herewith will help you to understand the action. A is one of the slide valves, B the valve rod, C one of the links, and D D are one pair of eccentric rods.

The steam pressure in the valve chest always has a tendency to force the valve and valve rod downward. This may not be directly apparent, but will be made clearer by considering the stem B broken off at E and the valve removed. Then the pressure on the upper end E of the broken off valve stem would tend to force it out through the stuffing box, as there is no steam pressure on the lower end of the valve stem to balance the pressure on the upper end. The effect is exactly the same when the valve is in place, and there is always a downward force acting on the valve equal to the cross section of the valve stem multiplied by the steam pressure.

Now, assume the valve to be in its highest position, as shown in the sketch. The link then occupies an inclined position with relation to the valve stem, and the downward pressure of the valve rod B and the resulting pressure between the link block and the lower side of the link tends to cause the link to slide to the position indicated in dotted lines, which is the reverse position.

The only resisting force to be overcome is the friction at the various bearings and joints of the reversing mechanism. The force tending to automatically reverse the engine depends therefore upon the diameter of the valve rod and upon the maximum "inclination" of the link, the latter in turn depending directly upon the throw of the eccentrics and inversely upon the length of the link.

Automatic reversal will sometimes occur on level road, but more frequently on hills, probably because on level roads the reverse lever inclines slightly forward when in position for forward motion, and is therefore held in place to some extent by gravity, while when ascending a steep hill the lever will stand nearly vertical and the gravity locking effect is lost.

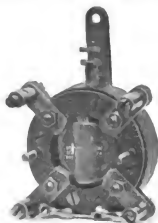
The only sure way of preventing the engine from reversing automatically is to provide the reverse lever with a latch pin which locks in notches in a sector.—Ed.]

An analysis of the entries in the British Reliability Trials shows an increase in the British competitors as compared with last year—seventy-six British cars against forty-one in 1902, the increase for foreign cars being from forty-three to fifty-nine. Thus the British increase is 85 per cent., while that of the foreign entries is 37 per cent. The principal increase is in cars built to meet the requirements of people of moderate incomes, cars costing under £400, and of this type upward of fifty cars are entered for the trials. Out of a total of 140 entries ten are steam cars.

NEW VEHICLES AND PARTS.

Herz Ignition Timer.

Herz & Co., of 55 Grand street, New York city, have brought out an ignition commutator for use in connection with

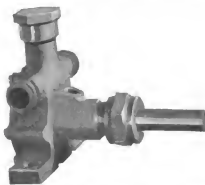


HERZ IGNITION TIMER.

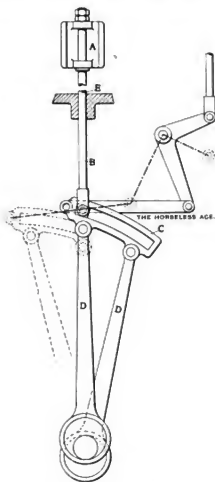
vibrator coils. The device is of very simple construction, contains no breakable springs and avoids the necessity of frequent adjustment, it is claimed. The contact piece, consisting of a steel pin sliding in a solid brass fitting, is enclosed in a cylindrical case of hard rubber, aluminum and steel. Grease and oil on the contact are said to do no harm, but are actually required for the lubrication of the contact parts. The device is made for engines of two, three and four cylinders and is claimed to work also with coils without vibrator.

A New Circulation Pump.

The cut herewith shows a new circulation pump manufactured by the Motor Car Supply Company, of Chicago. The principle of this pump is as follows: Within a cylindrical chamber revolves an eccentric piston, fitting snugly against the side walls of the casing and in the cylindrical shell. The casing is cast with two feet at the bottom and with a valve chamber on top, in which is slidably arranged a spring pressed disk valve which bears against the outer surface of the rotating eccentrics. This disk valve divides the space in the cylindrical chamber not occupied by the piston



NEW CIRCULATION PUMP.



SKETCH OF VALVE GEAR.

using a reverse lever that does not positively lock where placed."

Having just had a similar experience, except in a very slight degree, I have talked with a number of parties who understand engines thoroughly, and find that the matter is new to them. Will you therefore kindly explain to me in one of your next issues why and how it is that putting on a full head of steam to surmount a grade while the links are in their extreme forward position will cause the engine to reverse; and also how one with a carriage that does not have a positively locking reverse lever can avoid such an accident upon finding it necessary to ascend a steep incline from a standing start?

F. H. KELLOGG.



STEARNS SEMI-RACER, WITH W. G. SCHROEDER AT THE WHEEL.

into two parts, and as the eccentric piston revolves the two parts of the chamber constantly vary in size, one increasing while the other decreases. The suction and discharge ports are arranged in the cylindrical shell on opposite sides of the sliding valve.

When the centre of the eccentric is directly above the centre of rotation the entire free space of the pump chamber is in communication with the suction port and is filled with water. A moment later the suction port is closed by the revolving piston and the discharge port opened, and the charge of water is then forced out through the discharge port.

The Stearns Racer.

We give herewith an illustration of the 24 horse power Stearns racer which won several of the events at the recent Cleveland meet. This machine is one of the regular Stearns touring cars stripped for racing purposes and altered in a few de-

tails to increase the power of the motor and the speed of the machine on the track. The motor is a double cylinder one of 5¾ inches bore and 6¼ inches stroke, with aluminum crank case. It is fitted with a 24 inch flywheel weighing 160 pounds. The governing arrangement, consisting of a wedge shaped piece acting on the intake valve, has been done away with, and instead a butterfly valve on the inlet pipe is now used. A specially steep exhaust cam was used on the racer, which opens the valve very quickly and thus increases the power of the motor. The radiator is placed in front and consists of fourteen tubes side by side in the same horizontal frame, all connected in series and surrounded by the same gill. This forms one section of the radiator and there are twelve such sections, superposed and connected in parallel with each other. A small water tank was also carried on the racer, the total water capacity being 6 gallons.

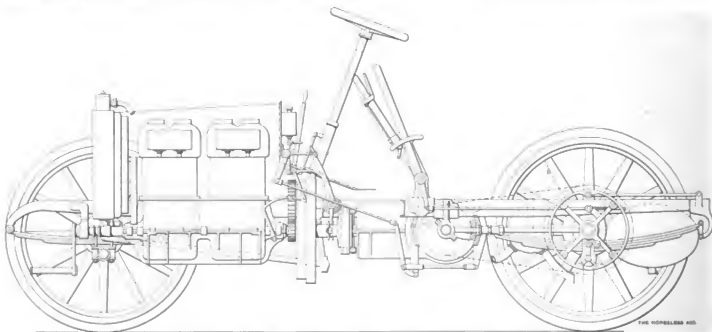
The car was entirely stripped of its speed change gear, and drove directly from the engine shaft to the rear axle by means of a 1½ inch pitch chain, the ratio of sprockets being 14 to 26. The vehicle frame is made of channel steel, the spring brackets being integral with the side members of the frame, the same as in pressed steel frames. The front axle is tubular, with axle ends electrically welded on. The steering pivots are of the Lemoine type and are provided with hardened steel bushings. Both front and rear axles are fitted with ball bearings, and it is claimed that this is the first heavy touring car to be fitted with such bearings all through. The wheels are of the artillery type, 34 inches diameter, with 12 spokes each and fitted with 4 inch tires. Double acting block brakes are fitted to the rear wheel hubs, and these brakes are operated by the same lever by which the friction clutch is operated, moving the lever in one direction, throwing in the clutch and moving it in the other applying the brake.

The entire body is of sheet aluminum and the vehicle stripped for racing, but with all supplies on board, weighs only 1,750 pounds. The gasoline capacity is 6 gallons.

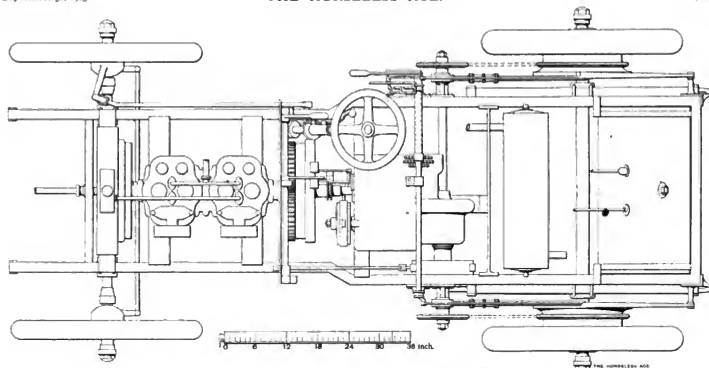
The car was only run in the Cleveland races and was remodeled for touring purposes directly after these races—that is, it had the change gear replaced, the sprockets changed, a touring body put on, and the several parts in which alterations had been made were changed back.

The Forty Horse Power Mercedes.

We print herewith a plan and elevation of the 40 horse power Mercedes touring car, sometimes called 35 horse power. The drawings do not show all the details complete, but show the general arrangement and all the main parts to scale. A full de-



SIDE ELEVATION OF 40 HORSE POWER MERCEDES TOURING CAR CHASSIS.



PLAN VIEW OF 40 HORSE POWER MERCEDES CHASSIS.

scription of this car has already been given in *THE HORSELESS AGE*, but it may be of interest to call attention again to a few of the special features of this machine, which are well brought out by the drawings. Both the water connections to the jacket enter on top, the pipes through which the water arrives being led down inside the jacket to near the bottom thereof. The motor and change gear are supported directly on the main frame by means of brackets east on their aluminum cases. The frame is narrowed in front. The car is provided with three entirely independent brakes—one acting on the second transmission shaft (at the front end thereof), one on the countershaft and one directly on the rear wheel hubs. The latter is hand operated and of the internal expanding ring type. The gear shifting and brake levers are mounted on concentric shafts, and the former works on a grid shaped sector, being capable of a sideward shifting motion. From the shaft of the gear shifting lever, downwardly, extends an arm carrying a gear sector at its lower end, which engages with one or the other of a pair of racks as the lever is shifted into one slot of the grid or the other, thereby being brought into operating engagement with one or the other of the two pairs of sliding pinions. The gasoline tank is placed beneath the frame in the extreme rear—the safest possible place. The muffler is arranged crosswise just in front of the rear axle.

The two axles are cranked—that is, their middle portions are lower than their spindles, and this admits of placing the frame extraordinarily low. It will be seen that the countershaft is practically on the same level as the rear axle spindles, and the distance rods occupy a substantially horizontal position.

The A. C. A.'s Club Run.

The fall automobile run of the A. C. A. started on Friday last in ideal weather. There was no formal start, as is customary in contests, but each participant in the run left the city at a time convenient to him. As far as can be learned twenty-four machines started, carrying about seventy people. Following is a list of the starters:

A. R. Shattuck (Panhard), Col. John Jacob Astor (Mercedes), M. D. Chapman (Mors), Colgate Hoyt (Mercedes), Winthrop E. Scarritt (White), Robert L. Morrell (Locomobile), James L. Breese (Mercedes), D. H. Morris (Rochet-Schneider), George F. Chamberlin (White), Jefferson Seligman (Rochet-Schneider), Dr. C. T. Adams (Oldsmobile), C. H. Gillette (Toledo), Frank Eveland (Autocar), Elmer Apperson (Apperson), Emerson Brooks (Cadillac), Dr. Lewis Morris (Fiat), Frederick Glassup (Winton), M. M. Belding, Jr. (Winton), J. V. Black (Winton), R. M. Owen (Franklin), S. K. Lichtenstein (Franklin), F. G. Webb (Winton) and Kenneth A. Skinner (De Dion).

Some of the participants indulged in fast running, and two were detained on the route for this reason. The first car arrived at Hartford shortly after 1 o'clock p. m. It was the Autocar driven by Frank Eveland. Fourteen machines had arrived at Hartford at an early hour on Friday evening. A few others arrived later in the evening.

On Saturday the run was from Hartford to Boston. By 8 o'clock p. m. fourteen machines had reached Boston. Kenneth Skinner was the first to arrive, at half-past 1 o'clock, having started early, at half-past 5 a. m. The following cars had arrived at 8 p. m.: Kenneth Skinner (De

Dion), Frank Eveland (Autocar), Paul Deming (White), J. J. Astor (Mercedes), James L. Breese (Mercedes), Dr. Lewis Morris, U. S. N. (Fiat); R. L. Morrell (Locomobile), Edward Weston (Mors), J. V. Black (Winton), A. R. Shattuck (Panhard), F. G. Webb (Winton), George F. Chamberlin (White), M. D. Chapman (Mors), and Colgate Hoyt (Mercedes). A number of the drivers took a wrong route during the day, which delayed their arrival.

On Sunday the tourists were entertained by the Massachusetts Automobile Club and on Monday the run was continued to Springfield. Seventeen machines carrying members of the Massachusetts Automobile Club escorted the tourists out of the city. Owing to rains during Sunday night the roads were rather heavy. Eighteen of the cars in the run started from Boston and twelve arrived in Springfield during the afternoon. Col. J. J. Astor had discontinued on Saturday evening after arriving at Boston, leaving there for Newport. Following is a list of those who arrived at Springfield at an early hour:

A. R. Shattuck (Panhard), K. A. Skinner (De Dion), Frank Eveland (Autocar), Paul Deming (White), J. L. Breese (Mercedes), H. D. Chapman (Mors), R. L. Morrell (Locomobile), Edward Weston (Mors), J. V. Black (Winton), G. F. Chamberlin (White), F. G. Webb (Winton) and C. H. Gillette (Toledo).

Members of the British Association for the Advancement of Science, during the recent annual meeting of that society at Southport, participate in an automobile excursion to the historic church at Poole. The procession comprised twenty-three cars, carrying about seventy-five members.

New York-Pittsburg Endurance Contest.

CHANGE OF DATES.

Owing to the abandonment of the race meet which was to have followed the Endurance Run at Pittsburg, the weighing of the cars will take place on Tuesday, October 6, and the start from New York made on Wednesday, October 7. The daily stages will be as follows:

Wednesday, October 7, New York to Pine Hill; Thursday, October 8, Pine Hill to Binghamton; Friday, October 9, Binghamton to Bath; Saturday, October 10, Bath to Buffalo; Monday, October 12,

Buffalo to Erie; Tuesday, October 13, Erie to Cleveland; Wednesday, October 14, Cleveland to Youngstown; Thursday, October 15, Youngstown to Pittsburg.

The following persons will have charge of the departments named during the progress of the run: Superintendent of observers, C. H. Gillette; superintendent of garages, L. L. Fest; weigher and inspector, M. L. Downs; press agent, A. B. Tucker.

ENTERTAINMENTS DURING THE CONTEST.

The National Association of Automobile Manufacturers has received notice from the Automobile Club of Buffalo and from the

Cleveland Automobile Club that arrangements are being made for the entertainment of the contestants in and officers of the Endurance Run in their respective cities.

The Buffalo Club, which has over 300 members, has made arrangements to keep open house at the Ellicott Club. The entertainment will be informal, partaking largely of the nature of a smoker, with some vaudeville performance, and with probably one or two short talks by prominent automobilists. It will begin early in the evening and last as late as anyone cares to stay.

The Cleveland Club has appointed a

Data of Cars Entered in New York-Pittsburg Endurance Contest.

No. Class.	Name.	Arrangement and Location of Engine.	Cycle of Engine.	No. of Cylinders.	Bore and Stroke.	R. P. M. at M. P. H.	Diam. of Wheels.	Wheelbase.	Form of Ignition.	Make of Tires.	Class of Tires.	Size of Tires.	Retail Price of Single Tire.
1G	Columbia	Forward, Vertical.	4	4	5x5	800	34	96	Jump.	Diamond.	Dbl.	4	\$55.80
2G	Columbia	Forward, Vertical.	4	4	5x5	800	34	96	Jump.	Diamond.	"	4	55.80
3G	Columbia	Forward, Vertical.	4	4	5x5	800	34	96	Jump.	Diamond.	"	4	55.80
4D	White	Forward, Vertical.	St'm	2	...	670	30	80	None.	G & J.	"	4	55.00
5D	White	Forward, Vertical.	St'm	2	...	670	30	80	None.	G & J.	"	4	55.00
6D	White	Forward, Vertical.	St'm	2	...	670	30	80	None.	G & J.	"	4	55.00
7F	Peerless	Front, Vertical.	4	4	...	660	34	92	High tension.	"	"	4	...
8F	Peerless	Front, Vertical.	4	4	...	660	34	92	High tension.	"	"	4	...
9E	Toledo	Forward, Vertical.	4	4	4 1/4 x 5 1/4	900	34	94	Jump.	G & J.	"	4	...
10C	Toledo	Forward, Vertical.	4	2	4 1/4 x 5 1/4	900	30	76	Jump.	G & J.	"	3 1/2	...
11B	Stevens-Duryea	Horizontal opposed, under seat	4	2	4 1/4 x 4 1/2	592	28	69	Jump.	Fisk.	"	3	27.50
12B	Stevens-Duryea	Horizontal opposed, under seat	4	2	4 1/4 x 4 1/2	592	28	69	Jump.	Fisk.	"	3	27.50
13C	Phelps	Front, Vertical.	4	3	4 1/4 x 4 1/2	900	30	84	Primary.	Diamond.	"	3	26.00
14D	Arrow	Front, Vertical.	4	2	3x4	900	32	81	Jump.	Goodrich.	"	3 1/2	45.00
15B	Pierce	Rear, Vertical.	4	1	3 1/2 x 4 3/4	1900	28	70	Jump.	Goodrich.	"	3	24.00
16D	Old Pacific	Horizontal, under seat.	4	1	6x6 1/2	625	34	88	Jump.	Diamond.	"	4	55.80
17A	Rambler	Horizontal, under seat.	4	1	5x6	907	28	78	Jump.	Diamond.	"	3	25.25
18A	Rambler	Horizontal, under seat.	4	1	5x6	907	28	78	Jump.	Diamond.	"	3	25.25
19B	Fredonia	Horizontal, under seat.	4	1	6x6 1/2	840	30	84	Jump.	Diamond.	Dbl.r.	3	28.00
20A	Fredonia	Horizontal, under seat.	4	1	6x6 1/2	700	32	73	Jump.	Diamond.	"	0	29.60
21F	Searchmont	Vertical, forward.	4	4	4 1/2 x 5	800	34	94	Jump.	Diamond.	"	4 1/2	77.92
22A	Covert	Vertical, forward.	4	1	4x4 1/4	1200	28	68	Jump.	Dunlop.	"	2 1/2	10.00
23B	Knox	Horizontal, centre.	4	1	5x8	770	30	72	Jump.	Fisk.	"	3 1/2	32.00
24D	Knox	Horizontal, centre.	4	2	5x7	650	32	84	Jump.	Fisk.	"	4	40.00
25D	Knox	Horizontal, centre.	4	2	5x7	650	32	84	Jump.	Fisk.	"	4	40.00
26B	Franklin	Vertical, forward.	4	4	3 1/4 x 3 1/4	1000	28	72	Jump.	Goodrich.	"	3	21.00
27B	Franklin	Vertical, forward.	4	4	3 1/4 x 3 1/4	1000	28	72	Jump.	Diamond.	"	3	21.00
28B	Franklin	Vertical, forward.	4	4	3 1/4 x 3 1/4	1000	28	72	Jump.	Goodrich.	"	3	21.00
29B	Haynes-Apperson	Horizontal, rear.	4	2	5x5	550	32	75	Jump.	Diamond.	"	3	25.00
30B	Haynes-Apperson	Horizontal, rear.	4	2	5x5	550	32	75	Jump.	Diamond.	"	3	25.00
31D	Haynes-Apperson	Horizontal, front.	4	2	5 1/4 x 6 1/2	420	32	80	Make and break	Diamond.	"	4	35.00
32A	Northern	Horizontal, under seat and body	4	1	4 1/4 x 6	840	28	70	Jump.	Dunlop.	"	3	26.50
33A	Northern	Horizontal, under seat and body	4	1	4 1/4 x 6	840	28	70	Jump.	Fisk.	"	3	25.00
34A	Northern	Horizontal, under seat and body	4	1	4 1/4 x 6	840	28	70	Jump.	Goodrich.	"	3	28.40
35E	Stearns	Horizontal, central.	4	2	5 1/4 x 6 1/4	400	34	96	High tension	Goodrich or Diamond.	"	4 1/2	61.75 F.
36G	Locomobile	Vertical, front.	4	4	4x5	600	34	82	Jump.	Diamond.	"	4	77.62 B.
37A	Holley	Vertical, front.	4	1	3 1/2 x 4	1600	26	56	Jump.	Hartford.	"	2 1/2	10.00
38G	Springer	Vertical, front.	4	4	5x6	400	36	68	Contact.	Goodyear.	"	4	74.50
39A	Oldsmobile	Horizontal, under body.	4	1	4 1/2 x 6	850	28	67	Jump.	Diamond.	"	2 1/2	12.50
40A	Oldsmobile	Horizontal, under body.	4	1	4 1/2 x 6	850	28	67	Jump.	Diamond.	"	2 1/2	12.50
41A	Oldsmobile	Horizontal, under body.	4	1	4 1/2 x 6	850	28	67	Jump.	Diamond.	"	2 1/2	12.50

large reception committee whose business it will be to meet the contestants outside of Cleveland and escort them to the headquarters. In the evening an informal reception will be held in the banquet room of the Hollenden Hotel. The committee has pledged itself to furnish any information desired, and to assist the contestants in all other ways in its power, and requested that all the contestants and officers register at the club's headquarters at the Hollenden.

The association has also received, in re-

sponse to letters written to the mayors and presidents of villages along the route, a great number of cordial assurances of co-operation, in the form of advice to owners of horses of the time of arrival of the cars, and the placing of the streets in the best possible condition. In some cases the supervisors have been instructed to remove the stones from the roads and to make all other suitable provisions for the success of the run.

Mayor Knight, of Buffalo, has given notice to the newspapers and has promised

to lend all possible assistance in directing the contestants and keeping the streets reasonably clear for them.

From Binghamton comes the information that the whole town is to be turned over to the automobilists. A committee of twelve members has been appointed, and is arranging for a smoker and vaudeville entertainment. The admission ticket to the smoker will be in the shape of a cardboard key, on one side of which will be printed the following:

"This key to Binghamton turns all locks. The time lock for the vaudeville and club smoker opens at 8:30 o'clock Wednesday evening, October 7, in clubrooms, Hotel Bennett, Binghamton. Without this key you cannot work the combination. You have the key—you own the city. Endurance Run, 1903."

On the other side will be the words:

"This passkey will open the door only in the hands of Mr. —. The committee asks you to come in your everyday togs."

It is further planned to give the contestants a grand send off, when they depart on the morning of October 8. Every automobile owner in the city will be asked to participate in a parade from the starting point to the city limits, thus giving the contestants an appropriate escort from the city. A band will head the procession.

A. L. A. M.

A meeting of the executive committee of the Association of Licensed Automobile Manufacturers was held in New York city on September 22, at the association's offices, on West Forty-second street. This meeting was followed by one on the 23d, which was attended by about twenty-four representatives. A banquet was held in the evening.

Nothing was given to the public concerning the proceedings of the meetings, except that the contract between members and their agents was modified to read as follows: "In consideration of the fact that the party of the first part has obtained a license under the Selden patent, No. 549,160, and is paying a substantial royalty thereunder, and has agreed as a consideration of said license not to contest said patent, directly or indirectly, or aid others in so doing:

"Now therefore, the party of the second part, in consideration of being supplied with licensed vehicles by the party of the first part under this contract, covenants and agrees with the party of the first part (1) that it (the party of the second part) will not, during the continuance of this contract, infringe said patent, nor make, sell, keep on hand, or in any manner dispose of or deal in, directly or indirectly, any unlicensed vehicles, that is to say, any gasoline automobiles not manufactured under license of said Selden patent; and (2) that it will not sell, consign or deliver any licensed vehicles purchased from the party of the first part under this contract to any party making, selling, having on hand or dealing in unlicensed vehicles."

Entries in Endurance Contest, by Classes.

No.	Made by	Operator.	Weight.	Price	Water Capacity.	Gasoline Capacity.	No. of Passengers.
CLASS A.							
17	Thos. B. Jeffery & Co.	Edward Collier.	1,350	\$750	3 3/4	6 1/2	2
18	Thos. B. Jeffery & Co.	Arthur Gardiner.	1,350	750	3 3/4	6 1/2	2
20	The Fredonia Mfg. Co.	F. L. Thomas.	1,300	1,000	3 1/2	8	2
21	B. V. Covert & Co.	B. V. Covert.	750	750	3	4 1/2	2
31	Northern Mfg. Co.	V. M. Gunderson.	1,000	800	4	8	2
33	Northern Mfg. Co.	A. W. Hall.	1,000	800	4	8	2
34	Northern Mfg. Co.	F. D. Homan.	1,000	800	4	8	2
37	Holley Motor Co.	George M. Holley.	880	650	3	5	2
39	Olds Motor Works.	E. R. Doan.	920	650	4	5	2
40	Olds Motor Works.	D. J. Wurgess.	920	650	4	5	2
41	Olds Motor Works.	Frank A. Wall.	920	650	4	5	2
CLASS B.							
11	J. Stevens Arms & Tool Co.	Otto Nestuan.	1,320	1,250	5	6	2
12	J. Stevens Arms & Tool Co.	Frank Duryea.	1,320	1,250	5	6	2
13	The George N. Pierce Co.	Percy P. Pierce.	1,250	1,200	6 1/4	5	4
19	The Fredonia Mfg. Co.	C. F. Gaither.	1,700	1,250	3 1/2	9	4
23	Knox Auto Co.	Howard M. Davis.	1,850	1,250	0	8	4
26	H. H. Franklin Mfg. Co.	W. H. Bex.	1,100	1,300	0	7	2
27	H. H. Franklin Mfg. Co.	C. A. Benjamin.	1,100	1,300	0	7	2
28	H. H. Franklin Mfg. Co.	John Wilkinson.	1,100	1,300	0	7	2
30	Haynes-Apperson Co.	George Barnes.	1,430	1,450	6	6	2
30	Haynes-Apperson Co.	Frank Nutt.	1,430	1,450	6	6	2
CLASS C.							
10	Pope Motor Car Co.	George Soules.	1,900	2,000	5 1/2	10	4
13	Phelps Motor Vehicle Co.	L. J. Phelps.	1,500	2,000	8	8	4
CLASS D.							
4	White Sewing Machine Co.	George S. Waite.	1,675	2,060	15	15	4
5	White Sewing Machine Co.	Webb Jay.	1,675	2,060	15	15	4
6	White Sewing Machine Co.	P. H. Deming.	1,675	2,060	15	15	4
14	The George N. Pierce Co.	Charles Sheppy.	1,950	2,500	4	10	4
16	Packard Motor Car Co.	E. T. Fetch.	2,200	2,500	6	10	2
24	Knox Auto Co.	J. E. Cowan.	2,450	2,200	0	18	4
25	Knox Auto Co.	Frank H. Fowler.	2,400	2,200	0	16	4
31	Haynes-Apperson	H. W. Lanterman.	2,350	2,500	10	12	4
CLASS E.							
35	F. B. Stearns Co.	F. B. Stearns.	3,000	3,000	8	18	6
CLASS F.							
7	Peerless Motor Car Co.	H. D. Savage.	2,400	3,500	?	15	4
8	Peerless Motor Car Co.	C. G. Wridgway.	2,400	3,500	?	15	4
21	Searchmont Auto Co.	L. S. Chadwick.	2,900	4,000	8	30	4
CLASS G.							
1	Electric Vehicle Co.	Harry Sendall.	3,100	5,000	10	20	6
2	Electric Vehicle Co.	Walter Neipoth.	3,100	5,000	10	20	6
3	Electric Vehicle Co.	B. B. Holcomb.	3,100	5,000	10	20	6
9	Pope Motor Car Co.	M. W. Winters.	2,700	4,500	5	15	4
36	Loomobile Co.	A. L. Riker.	2,300	4,000	7 1/2	15	4
38	Springer Motor Vehicle Co.	Frank T. Clark.	2,500	7,000	0	20	7

...OUR...
FOREIGN EXCHANGES.



New Narrow Tread Tire.

Since the Continental Caoutchouc and Gutta Percha Company brought out its narrow tread tires a year ago the narrow tread has been a favorite subject of discussion in European automobile circles; its anti-skidding qualities and comparative immunity from puncture are generally recognized and a number of tire makers have added a narrow tread pattern, including the Michelin firm. M. Michelin states that one weakness of the narrow tread tires as heretofore constructed is that the edges of the tread wear away rapidly, and to overcome this he imbeds in the edges of the tread at intervals of about half an inch rectangular pieces of iron. The tread is slightly concave.

The Deauville Races.

A 500 metres race, with standing start and stop, was held at Deauville, the French coast resort, on Thursday, September 10. It was originally intended to run mile and kilometre record races on the Deauville terrace, the same as in previous years, but it was later concluded that with the enormous speeds now attained by the big racing cars the distance available for getting up speed and slowing down was not sufficient, and the meet was practically abandoned, when it was suggested to make the events in the nature of standing start and stop races, which would be more a test of accelerating and braking power than of actual speed. The distance between tapes was 500 metres, or nearly one-third of a mile. The cars stood just behind the tape at the start and were allowed five seconds to get off. If they started within this period their time was counted from the moment of actual start, but if they took more than five seconds to get started, their time was counted from five seconds after the starting signal was given. The stop had to be made



BECONNAIS ON DARRACQ, FIRST IN THE LIGHT CAR CLASS.

right on the tape; if a competitor came to a stop off the tape, he was obliged to start again and draw up over the tape; but if he got more than 30 feet beyond the tape he was disqualified.

The weather during the meet was fine and a large crowd attended, in spite of the lateness of the season. Somewhat elaborate preparations had been made to insure public safety, the course being roped off and only officials being allowed within the enclosure. Many of the entries failed to appear, which proved rather a disappointment, and the meeting was only of short duration.

Most of the drivers put their brakes on too late and made their first stop beyond the tape, the opposite error of braking too early being made by only one or two of the drivers. The strains to which the transmission parts in such tests are subjected are enormous, and in the preliminary trials in the forenoon one tire exploded and one Cardan shaft was wrenched off. The timing was done with the Mors electric timing device.

Following are the three best times in both the racing and tourists' sections: Jeandr  (70 horse power Mors), 33 4-58; Beconna s (40 horse power Darracq), 358; Wagner (18 horse power Darracq), 35 3-58; Pelzer (Gardner-Serpollet), 42 2-58; Basson (Cl ment), 43 2-58; Bedell (Gobron-Brillie), 50 3-58.

The British Reliability Trials.

The Crystal Palace grounds were opened to the competing cars at 10 a. m. on Monday, September 14, and all the cars were required to report by noon on Tuesday, those failing to put in an appearance by that time being disqualified. Only 106 out of 140 entries reported before the expiration of the time limit. A number met with accidents on the way to the grounds.

The cars are housed in two tents, one large and one small, erected for the occasion. In the immediate vicinity of these two tents there are three others: a repairing tent, a press tent and an observers' tent. Elaborate provisions have been made in these tents for protection against fire.

On Tuesday, Wednesday and Thursday the judges of the trials were occupied with the preliminary tests—brake tests, noise tests, vibration tests and dust tests.

The brake trials began on Tuesday, on a hill within the Palace grounds leading from the Rockhills entrance to the cycle track. It should be mentioned that these preliminary brake trials are particularly for the purpose of ascertaining whether the cars are safe in this respect to participate in the endurance runs, and there were to be further brake trials later on right in the midst of some of the daily runs. The brake trials naturally divided into three parts—a test of the foot brake, a test of the hand brake and a test of starting power from a stop on a steep part of the grade. The test of the brakes consisted in unclutching the machine at a certain point on the test hill and applying the brake, the car carrying a full complement of passengers. Then the car was allowed to run backward down hill until upon signal from the observer the brake was applied, and the car had to come to a stop in a certain distance. The speed of the car when the brakes were applied was intended to be approximately the same for all, but as it depended upon the judgment of different observers it naturally was not. The restarting on the hill was a particularly difficult task for the small, medium powered cars, and many of these failed in this test—fifteen cars in all. Quite a number also failed to hold on the brakes, and some of the drivers proved rather unskillful in guiding



GASTE ON TWENTY HORSE POWER "AUTOMOTRICE," FIRST IN THE TOURISTS' CLASS.

their machines backward down the hill, and in a few cases charged a laurel bush at the side of the road.

On Wednesday the "dust tests" were held on the cycle track and the noise tests on a roadway near the switchback railway. The track had been covered with flour at a certain portion and a photographic apparatus rigged up, which was snapped automatically by an electrical device as the cars passed, and thus pictures of the flour dust clouds stirred by the car obtained. Note was also taken of the effect on the flour by the exhaust when the car was at rest. The cars were required to run over the floured sections at definite speeds, 20 and 25 miles per hour, the pace being set by a pilot car. These tests were not very satisfactory, as slight puffs of wind would greatly affect the dust cloudlets. During these trials the pilot car was set on fire, which added some excitement to the proceedings.

The noise trials were held in the afternoon. The judges were seated in a particularly quiet spot at some distance from the roadway. All the vehicles were required to pass by them, on their different gears successively. Then the drivers brought the cars to a stop right in front of the judges and ran their engines at both the highest and lowest speeds possible. The judges took notes of the degree of noisiness of each car for the different conditions, and by comparison of these notes will later on award the marks for noisiness.

On Thursday the parts entered for competition were given an examination and on Friday the reliability tests proper began with a run to Margate and back. In our next issue we shall print a full illustrated report of these trials.

A decree has been issued in France that automobiles, etc., intended for the Paris Show need not be examined at the customs houses at the frontier, as a temporary customs office will be installed in the Exposition Building, the very commendable object being to save trouble to exhibitors.

On Friday and Saturday, October 2 and 3, a series of speed trials will be held on the front at Southport, the well known Lancashire seaside resort, under the auspices of the Automobile Club of Great Britain and Ireland and the Liverpool Self Propelled Traffic Association. There will be eight separate races, including a motor cycle section with four events and a tourist section.

Apocryphal of different lining materials for automobile brakes a correspondent in an English contemporary states that he has tried fibre and found it no good, as it soon carbonizes and drops to pieces. Cotton belting is much better. Leather is perfectly useless, and the only reliable thing on really bad hills is metal to metal, with water cooling. Many cars have leather lined brakes, but woe betide the man who has nothing else on a steep hill a mile or two long.

Denver Automobile Day.

A series of automobile races was held on the Overland Park track, Denver, on Friday, September 25. During the forenoon there was an automobile parade through the city, which proved quite successful, though the start had to be delayed considerably. The parade formed in the rear of the Capitol on Grand avenue and started at a little before 11 o'clock. There were nearly 200 machines of all kinds in line, many being driven by women. The attendance at the races was good, and the only thing to mar the success of the event was that so many entries failed to start. The track was hard and fast, but as it is not banked at the turns no very good time could be made. Following is a summary of the races:

Five mile race for single seat gasoline stock machines, costing \$1,000 or under. Of seven entries, five started. C. V. Dasey, Rambler, took the lead at the start and won in 9:58.

Five mile race for touring cars with full road equipment. Won by W. B. Felker, Peerless, in 8:45.

Five mile race for gasoline machines costing over \$1,000 and up to \$2,000. Only the tonneau and trimmings were allowed to be taken off. Won by M. J. Patterson, Franklin, in 8:12½.

In the 10 mile race for cars costing between \$2,000 and \$3,000 the best time was made by a White steam car entered by the Colorado Motor Carriage Company, viz., 15:17½. A Peerless secured second place and a Winton third.

Both the fifth and sixth races were cancelled, owing to the non-appearance of the entries. The next event was a 5 mile race for gasoline machines, costing \$1,000 or under, stripped for racing. It was won by E. L. Matthewson, Oldsmobile, in 9:14½.

Ten mile race, open to all machines, costing under \$3,000, which could be stripped

to any degree desired by operators. George Herring, Stanley, winner; time, 14:45. W. B. Felker, Peerless, secured second place, and M. L. Lindahl, Winton, third.

In the ninth event, a 1 mile race for steam cars under 6 horse power, the Stanley machine driven by Herring again won, in 1:29¾. Then followed a 5 mile motor cycle handicap in which the following started: G. A. Maxwell (Max), scratch; G. W. Coffin (Orient), 40 seconds handicap; Ben Derks (Derks), 1 minute 5 seconds handicap. The race was won by Maxwell in 7:31¾.

The program also provided for obstacle and flag races, but as it was getting late and many of the entries had dropped out, these events were abandoned. During the evening there was another automobile parade which started promptly at 8 o'clock, and proceeded up Fourteenth avenue to the City Park, where they listened to a concert for some time. Then the parade partially disbanded, but about thirty machines returned together down Colfax avenue. All the cars participating in the night parade had all of their lamps burning, and some were decorated with Chinese lanterns.

Day and Night Automobile Run Chicago to New York.

A novel record run is at present being attempted by the Electric Vehicle Company to bring their new 24 horse power gasoline touring car prominently before the public. It consists in making a continuous run from Chicago to New York city in the shortest possible time, with proper regard to the safety of the drivers, the public and the machine. Four skilled chauffeurs will take turns in driving the machine. Two of these will drive the car through from Chicago to Cleveland, where their places will be taken by the other two, and they will proceed by train, some 300



COLUMBIA GASOLINE CAR MAKING RUN FROM CHICAGO TO NEW YORK.

miles, getting what sleep they can, when they will again assume charge of the machine. While one of the occupants acts as driver the other looks out for approaching teams and keeps track of the route.

According to the prepared schedule of the route, 357 miles will have been covered approximately at Cleveland. Erie brings the distance up to 452 miles, while Buffalo is 540 miles from Chicago. From Buffalo the route is by way of Corning, 685 miles; Binghamton, 768 miles; Kingston, 925 miles, and New York, 1,013 miles. It is possible, of course, that the road conditions may make some detours necessary and appreciably lengthen the distance between some of the points.

The drivers' previous knowledge of the highways included in their respective controls is comparatively small, although each has profited by a previous daylight run from New York to Chicago with the same machine. The roads from Chicago to Buffalo are mostly level, but there are long stretches of sand and other places that are liable to be bad in case of rain. From

leather. The body rests on semi-elliptic springs, and is supported by a main and a false frame, to which the machinery is secured. The footboard and dash are secured to the frame independent of the body. The engine is covered with an aluminum bonnet, with ventilating slots on the sides, and has three large doors permitting quick access to the engine.

The run was started upon at 4 a. m. on Monday, September 28. Waterloo, Ind., 194 miles, was reached at 1:10 p. m., with everything in good order.

Coal Tar for Road Improvement.

Mud and dust, the twin evils of our country roads, can be avoided at but little expense if a new method of road surfacing that has just been experimented with at Westfield, N. J., proves practical. The new method, which has been successfully used in France, consists in applying melted coal tar to an ordinary macadam road after it has been swept free of dust and loose material.

In the experiment at Westfield a 1,000

\$500 in 1904, characterizing it as absurd, in view of the present great demand for this machine. New ideas and inventions are constantly being tested at both their Lansing and Detroit factories and will be applied to their cars as fast as they are found practical. In addition to the runabout the Oldsmobile agencies will show a 10 horse power touring car and a light delivery wagon for the 1904 trade.

Thomas Motor Company's Plans for 1904.

The E. R. Thomas Motor Company, Buffalo, N. Y., write us that they are now at work on their 1904 automobiles and motor bicycles. It is their purpose to put on the market both a two and a four cylinder vertical motor car, of 16 brake horse power and 32 brake horse power respectively. They have applied for a patent on a new sliding gear transmission, three speeds, and working direct on the high, which is claimed to possess many points of superiority over other designs. This gear will be made a fea-



THE PROCESS.



ROAD TARRING IN NEW JERSEY.

THE EQUIPMENT.

Buffalo to Kingston on the Hudson the road surfaces are fair, but there are many hills to be encountered.

The four drivers are Bert Holcomb, Hartford (who is in charge of the run); Laurence Duffie, demonstrator of the gasoline vehicle department of the Electric Vehicle Company; David T. Adams, of Hartford, and Harry Sandol, of New York city.

The car is the regular 24 horse power Columbia gasoline touring car. The engine cylinders are of liberal dimensions in respect of the rated horse power, and a large flywheel is provided, which avoids the necessity of frequent gear changes even in hilly country. The body of the car as regularly made furnishes seating room for six persons, and is of the well known "King of the Belgians" type, with removable tonneau. As the car is arranged for the present test the tonneau has been removed, and in its place is carried a chest for supplies and tools. The front seat of the vehicle is divided, and the upholstery is of tufted

foot stretch of road was treated, one section being first carefully swept. Then, after the boiling tar had been applied with sprinkling pots, the screenings were put back and rolled. The other section was not swept before being treated. It was found that in three hours the tar had penetrated the road to a depth of over half an inch, binding the dust and stones and forming a surface that is claimed to be thoroughly waterproof. The cost of the process is about \$500 a mile for a road 16 feet wide—5 cents a square yard. Three thousand gallons of coal tar, costing about 10 cents a gallon, are required for a mile of 16 foot road. A section of road at Bath Beach, Brooklyn, is also under treatment, and the process is soon to be tried on the East River Walk, in Bronx Park.

Olds Plans for 1904.

In a letter received from the Olds Motor Works they again deny the rumor that the price of their runabout is to be reduced to

ture of the 1904 models, which will also be equipped with honeycomb radiators and other essential improvements. These cars will be built to develop a speed of 45 miles per hour. We are informed that prices and fully illustrated details will be available about October 15.

New Method of Scavenging Compression Chamber.

In a recent United States patent is described a new method of scavenging the compression chamber of an explosion engine. The apparatus consists of a sort of ejector through which water is forced by a pump driven by the engine, and which is also in communication with the combustion chamber of the engine through the exhaust pipe. It is claimed that the products of combustion are completely removed and all back action and noise is avoided, the stream of water sealing the discharge pipe. The arrangement is evidently intended for launch engines. Digitized by Google



An automobile bus company is seeking a franchise from the city council of Sterling, Ill.

Eugene Aldrich and Dan Raymond have opened an automobile repair shop in Wau-seon, Ohio.

The capital stock of the Geo. N. Pierce Company, of Buffalo, N. Y., has been increased from \$280,000 to \$315,000.

The Taunton Automobile Company, Taunton, Mass., are reported constructing fifty gasoline runabouts for Binney & Burnham, Boston, Mass.

The International Automobile and Vehicle Tire Company, Milltown, Mass., are about to place on the market an automobile tire under G. & J. license.

The Buffalo Automobile Racing Association is planning races to be held in that city on October 9 and 10, in connection with the Endurance Contest of the N. A. A. M.

Application blanks for space at the annual automobile show to be held in Madison Square Garden, New York city, next January, will not be issued until late in October.

Jos. B. Clark, a farmer living near Elwood, Ind., has sued George Wright, of Anderson, Ind., for \$10,000 for alleged injuries inflicted by defendant's automobile last May.

A well known New York firm of naval architects has completed the plans of a \$160,000 steam yacht which is to have special quarters for a 20 horse power automobile.

Following the example of the Boston branch the Y. M. C. A. of Minneapolis has instituted courses of study in automobile and launch engineering for the benefit of its members.

The Marble-Swift Automobile Company of Canada, Limited, has secured a factory for the manufacture of automobiles at Woodstock, Ontario, and is interesting local capital.

The Banker Brothers Company, Philadelphia, Pa., reports the following sales of Autocars: F. T. Patterson, Rosemont, Pa.; Alexander Allan, Chestnut Hill, Pa., and T. F. Kelley and C. T. Wernag, Philadelphia.

E. R. Russell, at one time master mechanic of the Overman Wheel Works and later with the Electric Vehicle Company, has succeeded Reynold Janney as superintendent of the Locomobile works at Bridgeport.

At the San José, Cal., races recently the five mile race, open to machines of any type or power, was won by a White steam touring car; the race for gasoline machines only was won by a Rambler, and the race for gasoline machines of 20 horse

power or less was won by a Winton touring car.

The Cushman Motor Company, Lincoln, Neb., are perfecting an opposed cylinder motor for automobiles.

Over \$200,000 worth of foreign automobiles are said now to be in the appraiser's warehouse at New York city, awaiting agreement between their owners and the customs officials in regard to their values.

Harold Remington, referee in bankruptcy of the estate of the General Automobile and Manufacturing Company, Cleveland, Ohio, has applied to the court for permission to sell the assets at public or private sale. A hearing will be held at the referee's office on October 6.

Sales of automobiles for the week ending September 19 are reported by Banker Brothers Company, of Philadelphia, as follows: Autocars, to Laurence McCormick, Thomas H. Halton and E. Eichler, of Philadelphia; Alexander Allan, of Chestnut Hill, Pa., and F. C. Rogers, of Wilmington, Del.

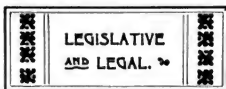
The Motor Car Supply Company, of 1427 Michigan avenue, Chicago, have brought out a new dashboard watch. The watch contains an imported Swiss movement of large size and the case is of polished brass, attached from the inside with three screws, and rests at an angle to admit of convenient reading. The watch is said to be water and thief proof.

Reynold Janney, for the past two years superintendent of the Locomobile works at Bridgeport, has accepted the management of the Edison Storage Battery Works, at Glen Ridge and Silver Lake, N. J. On resigning his position in Bridgeport he was made the recipient of an elegant solid silver tea service and a beautiful water color painting by the employees of the company.

Winners in English Motor Cycle Trials.

The following machines won first class certificates in the recent 1,000 mile motor cycle trials in England: $\frac{3}{4}$ horse power spring frame Bat, 2 horse power Bradbury, 3 horse power Chase, $\frac{2}{3}$ horse power Kerry, $\frac{3}{4}$ horse power King, $\frac{3}{4}$ horse power Ormonde, 2 horse power Werner; the following second class certificates: $\frac{2}{3}$ horse power Alldays & Onions, $\frac{3}{4}$ horse power Booth, $\frac{2}{3}$ horse power Bradbury, 2 horse power F. N., $\frac{2}{3}$ horse power Griffon, $\frac{2}{3}$ horse power J. A. P., $\frac{2}{3}$ horse power Lagoda, $\frac{2}{3}$ horse power Matchless, 2 horse power Peugeot, $\frac{3}{4}$ horse power Phoenix tricycle, $\frac{2}{3}$ horse power Robinson & Price, $\frac{2}{3}$ horse power Werner; and the following third-class certificates: $\frac{2}{3}$ horse power Ariel, $\frac{2}{3}$ horse power Castell, $\frac{2}{3}$ horse power Phoenix, 3 horse power Rex.

There is to be an alcohol exhibition at Vienna, Austria, from April 16 to May 31, and a special section will be devoted to automobile motors driven by that fuel.



The Staten Island Disaster in Court.

Suits arising out of the fatalities during the road races on the Staten Island boulevard, held under the auspices of the A. C. A. on May 31, 1902, will come up in the October term of the Richmond County (New York) Court. The plaintiffs are Louise Johnson, Oscar S. Johnson, John E. Brick, Thos. H. Taylor, Mary C. Bogert (administratrix) and Elizabeth Featherstone (administratrix, etc.). The defendants are the city of New York, the Automobile Club of America, the Baker Motor Vehicle Company, Roland C. White, M. L. Goss, Frederick R. White, Walter C. Baker, Edward Denzer, Albert R. Shattuck, David H. Morris, George Isham Scott, William Henry Hall and James M. Hill.

The city council of Salem, Ohio, is planning an auto ordinance.

The city auditor of Cincinnati, Ohio, is after thirty-five automobilists who have failed to take out licenses.

An ordinance limiting automobiles to 6 miles an hour has been passed by the city council of Noblesville, Ind.

The Wayne County (Ind.) A. C. objects to a clause in a recently passed ordinance forbidding carrying reflector headlights.

The chief of police of Boston, Mass., has declared his intention to vigorously enforce the automobile numbering law of the State.

The Freeport, Ill., council has passed a license ordinance, fixing the fee at \$2 and the penalty at not less than \$10, nor more than \$100.

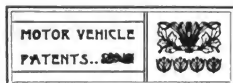
The new automobile ordinance of Grand Rapids, Mich., requiring numbers to be painted on the glasses of automobile lamps, has excited lively opposition.

Automobile owners of Omaha, Neb., are protesting against a proposed automobile ordinance limiting the speed of their machines to 6 and 8 miles an hour.

It is reported on good authority that a bill will be introduced in the Ohio Legislature the coming session, forbidding automobile races in the State, and placing them in the same category as prize fights.

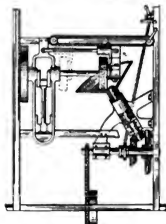
The Automobile Club of Kansas City, acting on the advice of counsel, has consented to refrain from using the Cliff Drive, a boulevard much frequented by horse drivers and dangerous if horses become unruly.

The other day an automobile from Faribault, Minn., strolled into St. Paul without a number and certificate, and was "sealed" and drawn to the curb by the State Boiler Inspector until later the owner appeared with a certificate and a legal number.



United States Patents.

737,696. Power Transmitting Mechanism.—P. W. Bettinger, of San José, Cal. September 1, 1903. Filed August 30, 1902.



No. 737,696.

This patent relates to a friction drive for automobiles in which the driven friction member is cup shaped. A disadvantage of this arrangement seems to be that the friction wheels cannot be used for reversing and that a double pair of bevel gears is required in addition to the friction wheels, not to speak of the chain drive connection to the rear axle.

739,293. Water Cooler for Motive Power Engines.—Edmund L. Cooper and

David T. Davies, Birmingham, England. September 22, 1903. Filed March 7, 1903.

739,292. Apparatus for Feeding Fluid Fuel.—Melvin D. Compton, New York, N. Y. September 22, 1903. Filed January 22, 1903.

739,664. Motor Cycle Frame.—Hoover W. Freed and Alfred S. Clegg. Yeagerstown, Pa. September 22, 1903. Filed January 30, 1903.

737,653. Power Transmitter.—Eddy T. McKaig, Chicago, Ill. September 1, 1903. Filed March 23, 1903.

737,652. Power Transmitter.—Eddy T. McKaig, Chicago, Ill. September 1, 1903. Filed January 26, 1903.

738,992. Sparking Plug.—Henry C. Folger, of Somerville, Mass. September 15, 1903. Filed June 4, 1903.

The exterior metallic shell of the plug is of usual form. It comprises a part exteriorly screw-threaded for insertion into the cylinder of the explosive engine, and a second part screw threaded into the first part for allowing of the insertion of the spindle and insulation of the plug. A shoulder is formed upon the insulation and the parts of the exterior shell clamp the shoulder firmly, rings of asbestos being placed around either side of the shoulder. The shell of the plug is also provided with a suitable terminal of platinum or German silver.

The insulation for the plug consists of a porcelain core and an inner mica tube. The mica tube may be formed of thin sheet mica rolled up into a tube by the aid of suitable adhesives, tubes of this character now being a regular article of manufacture.

The tube is of sufficient length to extend beyond the inclosing metal shell, so that a

double insulation exists at all points where it would be possible for a spark to pass from the central spindle to the metallic shell. The mica tube is also arranged to project slightly beyond the terminal end of the porcelain core, and mica washers are placed at the opposite end of the porcelain core, so that when the spindle is clamped in position the metallic portions of the spindle do not clamp against the porcelain core, but against mica at each end, by which means a tight and solid plug



No. 738,992.

is produced without substantial danger to the porcelain by breaking. Since the mica tube does not extend entirely through the porcelain core, this result is readily obtained.

Trade Literature Received.

Wm. H. Haskell Manufacturing Company, Pawtucket, R. I.—Catalogue of bolts, taps, screws, nuts, chain links, etc.

International Automobile and Vehicle Tire Company, Milltown, N. J.—Circular of solid and cushion rubber tires.

The Bliss-Chester Company, 31 Matthewson street, Providence, R. I.—"Radiators and Materials for Manufacturing Radiators."

Hayden Eames, American Trust Building, Cleveland, Ohio.—Catalogue No. 1. Hercules Light Automobile Parts. This catalogue comprises three sections, as follows: Front axle and steering gear section, rear axle section and brake and frame section.

LABORATORY OF

VICTOR L. EMERSON,

MECHANICAL WORK OF PRECISION,

WORK OF METALLURGY AND ORGANIC MATTER.

CINCINNATI, OHIO.—Aug 13th 1903.

Mr. E. P. Ingersoll,
Publisher Horseless Age,
147 Nassau St., N.Y.

Dear Sir,

Enclosed find check for to cover cost of special bill rendered for amount \$8.00, and for another years subscription beginning Sept, 2nd 1903,

I received more inquiries than necessary to sell the several machines advertised, they came from Maine to California your paper must get around pretty lively,

Thanking you for your favors I am,

Respectfully Yours

V. L. Emerson

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to
Motor
Interests

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The Endurance Contest

When this issue reaches our readers the first annual endurance contest of the N. A. A. M. will be in full progress. Since our last number went to press one car has been added to the entry list, and the total number of machines entered is now forty-two. Though the number of entries is comparatively small, the event will unquestionably be the most important of the season, at least as far as its usefulness to the prospective purchaser is concerned, and it will therefore be given proportionate attention in our columns. As already announced, our issues of October 14 and 21 will be specially devoted to this contest. A staff of our technical contributors will accompany the run, some on competing cars and some by train, and we can promise our readers a most exhaustive and detailed report. It will deal most fully with the things that actually happened during the run which may be of assistance to the prospective purchaser. Our reports of the two preceding annual endurance contests have been found very helpful by persons desirous of purchasing automobiles, and have been widely read outside of our regular circles of readers. The report on the present contest will be equally practical and comprehensive.

The Dangers of Horse Traffic.

Everyone knows that horses occasionally shy and run away, thereby causing personal accidents of more or less gravity, but few have any idea of just how much damage and injury is being done in this way. One thing is certain, and that is that a serious horse accident does not receive nearly the same attention in the newspapers that is given a similar automobile accident. If a horse runs away and kills somebody the accident receives due notice in the local papers, but is not telegraphed all over the country, unless the person involved enjoyed a national reputa-

tion. Not so with an automobile accident. An automobile fatality, wherever it occurs and whoever the person killed may be, will surely be reported at some length in most of the leading dailies all over the country. We do not protest against this as long as the newspapers tell the truth about the accidents, for it is to be presumed that they select their news matter in accordance with its value and interest to their readers, and that more attention is given to automobile accidents than to horse accidents simply shows that the public is more interested in automobiles than in horses, or, rather, in the dangers of automobile traffic than in the dangers of horse traffic.

Horse traffic is an old subject and its dangers and other features are supposed to be well understood. Yet, as stated, we doubt whether there are many who have any adequate idea of how many fatalities are annually caused by horses, and how many other serious accidents.

Our English contemporary, the *Auto Car*, has during the last twelve months compiled some statistics regarding horse accidents in England, and has thereby done a real service alike to the general public and to those interested in the automobile movement. The information was gathered by arrangement with a clipping bureau, and it is evident that the figures must be incomplete, for even if the bureau scanned carefully practically all the newspapers certainly all horse accidents are not reported in the papers. According to the figures obtained there were 3,991 accidents in all during the year ending August 29 last. Four hundred and eleven persons were killed in these accidents and 2,991 injured. There is therefore an average of more than one person killed by horses in England per day and more than eight injured.

The conclusion to be drawn from these figures is that there is a good deal of dan-

ger in horse traffic. This danger is due chiefly to the shying proclivities of the horse, for which there is no equivalent in automobiles, and it is tolerably certain that when the speed craze has once passed away the proportion of automobile accidents to automobiles in use will be much smaller than the proportion of horse accidents to horses in use.

The English Reliability Trials.

The Automobile Club of Great Britain and Ireland has just completed its fourth great annual automobile competition, which, like the preceding one, has proven a decided success. The number of entries was larger than in any of the previous events, and the trials were severer and more diverse. While the final results are not yet in at this writing, it appears from the information at hand that the aggregate showing was very creditable and that the results will bear witness to great progress in motor vehicle construction during the last year or two.

A good many of the mishaps that occurred and led to the withdrawal of machines were the result of so-called "friendly brushes" between competitors—in other words, of scorching. It is unfortunate that there are always some drivers in these contests who will let their sporting proclivities run away with them and deliberately seek opportunities for speed matches, when their showing in the contest can in no way be improved thereby and the risks of breakdown and interference by the police are greatly increased.

Among the causes of mishap are mentioned a number of collisions, which again illustrates the danger of running too closely together in such a contest.

The routes this year included many severe hills, and although, as has been pointed out, the entries showed a large number of "cars for men of moderate means," that is, small cars, the performance in the hill climbing trials was on the whole very satisfactory—much better, in fact, than in previous years. With light cars the question of hill climbing ability is, of course, most important, and that these cars showed up so well on the hills is a sign of substantial progress in the right direction.

There were several changes in the weather during the progress of the trials. During the first days the dust nuisance was experienced in all its severity, as can readily be understood when it is remembered that about two cars were in line. The fourth

day the run was made in a drizzling rain, which, while it laid the dust, hardly improved conditions so far as the comfort of the contestants was concerned.

During the hill trials the road was again blocked by cars failing to reach the summit, thereby compelling other vehicles to stop. This is certainly a weak point of hill trials in the midst of a non-stop run, and will be avoided in the coming American contest, in which the hill trials will be held at the completion of the endurance trials.

Cleaning Autos—Compressed Air.

Frequent cleaning of automobiles is desirable, not only for the sake of the appearance of the car but also because it conduces to longevity of the mechanism. To thoroughly clean a car is not a small job, and, unless the owner keeps a chauffeur whose entire time when not driving is available for cleaning and adjusting, the car is likely to be neglected in this respect. A very large majority of owners are their own drivers, and, although many of them hire a man or boy to clean the machine periodically, it may be safely assumed that few machines are cleaned as regularly and thoroughly as would be desirable.

The problem of cleaning was even a more difficult one in former years when wire wheels were the rule. Then some users of light steam cars discovered that a very good method of cleaning these wheels and other parts of the mechanism was to turn a jet of steam at full boiler pressure on them. This dislodged the dust and dirt very rapidly and very effectively, but it was necessary to grease the parts thus cleaned immediately after with vaseline, etc., or they would rust. The greasing is, of course, in itself objectionable, for a greased surface collects and retains dust, and the parts lose their brightness almost immediately.

Compressed air would undoubtedly be as effective for this purpose as steam, and would have the advantage of not wetting and rusting bright metal surfaces; it is at present used for cleaning railroad car cushions, carpets, etc. For taking the dust out of driving chains and the corners and crevices of the motor and transmission gear, a jet of compressed air at 200 pounds pressure or thereabout would certainly be much more effective than a cotton rag or a handful of waste, now generally used for this purpose, and very much faster. The process would be particularly applicable to the cleaning of the mechanism as distinguished

from the cleaning of the body and wheels—that is, the varnished surfaces—though it might also answer for that. It ought to be possible to devise a small air compressor and tank which could be readily attached to a car and driven from the engine, and we expect to see some enterprising firm place an apparatus of this kind on the market soon.

Calendar of Automobile Dates and Events.

- October 7 to 15—New York-Pittsburg Endurance Contest.
- October 10—Race meet of the Automobile Club of Philadelphia.
- October 22 and 23—Automobile Races of Macon Fair Association, Macon, Ga.
- October 31—Brighton Beach, New York. Race Meet.
- December 10 to 25—Paris Automobile Exhibition.
- January 15 to 23—Madison Square Garden Automobile Show.

Independent Automobile Association of America.

An association has just been formed among gasoline automobile manufacturers not members of the Licensed Association under the title of the Independent Automobile Association of America. The organization was effected at a meeting at the Waldorf-Astoria Hotel, New York city, on October 1, and the following executive committee was appointed: Henry C. Cryder, of the Moyea Automobile Company; F. A. LaRoche, of the American Darracq Automobile Company; H. C. Robinson, of the Star Automobile Company, Cleveland; J. R. Chisholm, of the Standard Automobile Company, New York, and P. H. Sercombe, of the Standard Automobile Company, of Chicago.

The membership fee is \$200 and the yearly dues are \$2,500 and one-half per cent. on the gross output of each factory, payable quarterly.

Japan for Motor Vehicles.

Two gallons raw linseed oil, 2 pounds litharge, 1 pound red lead, 1 pound black oxide manganese, 2 pounds shellac. Put into a suitable melting pot and heat the mixture until it boils or reaches a temperature of 450° Fahr., and maintain that heat for two hours; then gradually add the litharge and red lead driers, a little at a time, and alternately, adding first one and then the other. When all the driers have been added and digested in the hot oil, put in 1 pound of shellac, and when that has melted add the manganese oxide, and keep up the heating for two or three hours longer at about 200° Fahr.; then allow the mixture to cool, and thin down by adding 1 to 1½ gallons turpentine. This compound becomes a hard, enamel-like coating if baked in a stove or enameling oven.—*English Mechanic.*

Cylinder Capacities of Gasoline Engines.

By J. S. V. Bickford.

With reference to Mr. Clough's article in a recent issue of THE HORSELESS AGE I may say that I have taken some considerable trouble to get at this point. As Mr. Clough says, formulae for this purpose are almost useless, and the only thing to do is to go through the results of actual trials with the cylinder capacities and deduce therefrom the power of the engines.

I have carefully gone through the results of the club trials last year and have made out the annexed table of results. In the case of columns 3 and 5 the data had to be worked out, for the club rule was all wrong for horse power. By some oversight no one appears to have noticed that by the rule used the power was very much underestimated. In order to arrive at the power exactly from the results on hills it became necessary to ascertain the rise and length of the two test hills. Contours of these hills are given in the results published, but a few examples soon showed that the whole hill had not been used and the part used was not stated. It was therefore necessary to work the club formula backward to arrive at the rise of the hill. On top of this some of the results did not agree with themselves. For instance, in one or two cases in which I worked out results by the rule for total weight of car and passengers, which involved the horse power, and by the fuel consumption rule, which also involved it, the results differed by 25 per cent. However, on the whole I believe I have arrived at the height of these hills fairly accurately, especially as the rise of the hill and length of same agree with two points on the contour published.

It will be noticed that only in very few cases does the horse power on these hills come anywhere near the advertised power of the car. It does not follow from this that the power of the car has been misstated. The engine power may be stated and losses in transmission neglected, and in addition to that it is, of course, possible that neither of the two test hills exactly suited the gear of the car. Thus, suppose the car in question would just fail to take a hill on the second speed, it would have to go down to its lower speed, and the engine would not be doing full duty.

I believe the results as to cylinder capacity per brake horse power will be rather surprising to many of your readers. For instance, it will be noted that in two cases the De Dion engine developed on the car wheels 1 brake horse power for 11 cubic inches of cylinder capacity, while the Century tandem did even better. In several cases 1 horse power was developed for 13 cubic inches, and the average of the whole list is under 20 cubic inches per horse power.

In arriving at the necessary diameter of a cylinder it is hardly fair, however, to take the average of this list, for, as has

Car	Weight Formula	Estimated Horse Power	Best Actual Horse Power	Cylinder Displacement, Inches	Cylinder Capacity Per Brake H. P.	Number of Cylinders
Humber Cycle.....	291.2	4	1.64	3x3	12.8	1
5 h. p. Century Tandem.....	1075.5	4½	2.82	3½x3½	10.6	1
5 h. p. Peugeot.....	1204	6½	2.1	4x4	25.5	1
7 h. p. Star.....	2380	7	3.4	3½x4½	22.5	2
4½ h. p. Renault.....	1272.3	6	2.5	3½x4	14.4	1
8 h. p. M. M. C.....	1832.3	8	3.85	3½x5½	17	1
6 h. p. De Dion.....	1512	6	3.85	3½x4½	11	1
10 h. p. De Caille.....	2559.8	10	5.05	4½x4½	25	2
10 h. p. G. Richard.....	2163.8	10	4.8	3½x5½	18	2
9 h. p. James & Browne.....	2699.2	9	5.75	4x6	26	2
12 h. p. Gladiator.....	2260.2	12	6	3½x4½	14	2
9 h. p. Brooke.....	2884	12	5.1	3½x4½	30	3
7½ h. p. Wolseley.....	2374.4	8	4.77	4x4	21	2
12 h. p. Wolseley.....	2865.8	10	7.25	4½x5	21.6	2
12 h. p. Belsiae.....	2880	12	5	4x4½	22.5	2
9 h. p. New Orleans.....	2031.7	9	4.75	3½x4½	18	2
8 h. p. De Dion.....	2212	8	4.74	3½x4½	18	2
8 h. p. Clement.....	2032.8	—	3.33	3½x3½	12	1
12 h. p. Gladiator.....	2383.4	12	6.7	3x4½	17.6	4
10 h. p. Ariel.....	2396.8	10½	5.6	3½x4	12.3	2
12 h. p. Century.....	2777.6	11	6.5	3½x4½	12.5	2
10 h. p. M. M. C.....	2548	10	4.9	3½x5½	25	2
7½ h. p. Germain.....	2772	—	4.53	3½x4½	12.6	4
10 h. p. Peugeot.....	2912	16	10.75	3½x5½	15	2
12 h. p. Brush.....	2777.6	14	6.35	3½x4½	26	4
12 h. p. Humber.....	3024	12	7	3½x4	22	4
20 h. p. Wolseley.....	3808	21	15.9	4½x5	20	4
15 h. p. Wilson & Filcher.....	3108	12	6.9	3½x3½	21	4
16 h. p. Clement.....	3108	20	10.5	3½x5½	21	4
12 h. p. Daimler.....	2464	12	9.3	3½x4½	12.6	4
20 h. p. M. M. C.....	3276	14	8.5	3½x5½	17	4
20 h. p. Pascal.....	3024	24	8.7	3½x5½	28	4
20 h. p. Pascal.....	3528	32	9.8	4½x5½	36	4
20 h. p. Pascal.....	3724	32	15.3	4½x5½	24	4
22 h. p. Daimler.....	3536	25	11.2	5x5	26	3
22 h. p. Daimler.....	3612	22	14.5	4½x5½	22	4
15 h. p. Panhard.....	3871.8	18	17	3½x5½	12.2	4

been pointed out, in many cases the losses in transmission are considerable.

If, for instance, the Panhard without any direct drive can develop 1 brake horse power on the road wheels for every 12.5 cubic inches of cylinder capacity, it seems fair to expect that any well built engine shall develop at least 1 brake horse power for each 12 cubic inches, and it is not too much to expect that it should do 1 horse power for 10 cubic inches. This result of the Panhard is by no means unique, as I know a car in my town of that make having a 5 horse power engine, with a cylinder capacity of about 60 cubic inches, which will develop on hills close up to 5 brake horse power on the wheels.

Chain Gear Design and Care of Chains.

To insure satisfactory running and wear of automobile transmission chains it is necessary, not only that the chain be thoroughly well made and of suitable material, but also that the sprockets be accurately cut and means provided for maintaining them in proper relative positions; also, the chain must not come in contact with anything except the bearing surfaces of the sprocket teeth. The proper operation of chains depends, therefore, largely upon the work of the car designers, and it may be of interest to these to summarize here what

two of the leading chain manufacturers of the country have found to be the reasons why chains sometimes do not work as they ought to.

Too small sprockets should be avoided, and nine teeth should be regarded as the lower limit. Besides the bad effect on the teeth, the wear of a sprocket is greater the smaller the number of teeth. It is claimed that a ten tooth pinion possesses an appreciable advantage over a nine tooth pinion.

In the cutting of the teeth on the sprockets it is of the greatest importance that the bottom diameter of the sprockets is made exactly that recommended by chain manufacturers. Little variations in the length of teeth and their form are permissible, but accuracy in the bottom diameter is very essential. It is also important that all teeth be exactly alike, which requires a fairly perfect indexing attachment on the milling machine or gear cutter in which the sprockets are cut. If one or more teeth are considerably heavier than the rest much damage is likely to result.

The teeth should be rounded on both sides from the pitch line outward, and the sharp corners should be taken off, this latter precaution being particularly essential on hardened sprockets.

The hubs of the sprockets must be sufficiently below the bottom line of the teeth to prevent the side links riding on the hubs. The chain must not strike the gear

cave, frame members, pipes or operating rods under any conditions of spring flexure, and it is well to allow a good clearance on either side. The sprockets should be so located and so secured in place that they are easily removed and replaced. If this point is given due attention, sprocket renewals will not be very expensive. Chains will not work satisfactorily on unduly worn sprockets, and easy and inexpensive renewal is therefore desirable.

The size of the chain should be well proportioned to the power and weight of the car—in other words, to the strains the chain has to bear. Distance rods or chain struts should always be used, and the tension of the chain be kept fairly constant. The tension should be adjusted so as to allow the chain to run freely, without any unnatural strains, which would ruin it in a short time.

The life of chains depends very much on the care they receive in the way of cleaning and lubrication. The application of lubricant to the outside of the chain is of doubtful value. Lubricant thus applied has a tendency to catch and hold dust and dirt, and does not readily get to the wearing surfaces of the pins and links, where it is wanted. The chains should be thoroughly cleaned several times a year with hot water and a brush and then with kerosene. After they have dried they are preferably given a treatment with some chain lubricant. The best chain lubricants are those which are solid when cold and are heated and the chain soaked in them while the lubricant is in the liquid state, the reason being that a dry lubricant will not collect dust to any extent. For this same reason graphite makes a very good constituent of a chain lubricant, and a leading graphite manufacturer now produces a graphite chain lubricant which is applied by the "heating and immersion" process. The chain must be left in the bath of lubricant long enough to allow the latter to penetrate into all the joints; it is then taken out and dried and cleaned of any lubricant adhering to the outside of the links.

Automobile Bodies.

The different styles of automobile bodies, as well as the different types of body construction, are a subject of growing importance to the trade and user alike. The evolutions that have taken place in body styles, tending, as they do, to several distinct types, are little less interesting than the engineering developments in the automobile field. Also the way in which the automobile body has developed from and beyond its progenitor, the carriage body, introducing new forms and styles, substituting metal for wood work, and modifying the upholsterer's art, bespeaks progress and invention as surely as does the work of the engineer.

There are several recognized types of automobile bodies, each divided into sub-

types. Distinctively American is the runabout type, made familiar by thousands of light steam and gasoline and some electric vehicles, and having but a single seat and light frame. As distinctively French is the tonneau type—the body with the plain or divided front seat and the barrel-like rear, often detachable and capable of seating from two to five persons. The survey, which has been international in its development, may be said to constitute a third type, although in general it is but little different from the ordinary runabout, except in the matter of having an extra seat, and, perhaps, in belonging to a machine of heavier build.

Intermediate between the foregoing is a host of body styles that fall into no definite classification, although they partake of the characteristics of one or more of the types enumerated. Besides the variants of accepted types, there is the multitude of freak models—folding tonneaus, double and triple tonneaus, buckboards and the many abortive styles that fashion has established in electric vehicles.

Of variants from the tonneau model, there are the limousine and cab bodies, usually of regular tonneau build, except that they are enclosed, or partially enclosed, and roofed over. Even the familiar canopy top is now often seen with glass in both the front and the rear, thus approaching the limousine construction. In machines of all of these forms, the rear door seems gradually to be giving place to a side door, or to a lifting or swinging front seat.

Runabouts are now often fitted with a rear seat, sometimes of the dos-à-dos pattern, but more often of a regular tonneau style, although in such cases it is generally small, and the machine, unlike regular tonneau vehicles, has its engine under the seat, a practice usual only in runabout machines. Other runabouts are fitted with small, and usually folding, seats in front. Victorias and Stanhopes embodying this idea are not common. Tops for runabouts are almost always of the same pattern as those used on horse drawn buggies or victorias.

Storage space is provided more liberally in most modern bodies than was the practice in the past. Beneath the seats of the tonneau, on the roofs of the canopy and the limousine, and under the seat or in a box in front of the runabout, we now find room for anything, from a few tools and supplies to extra tires.

The materials of which automobile bodies are built and the ways in which they are framed and constructed present considerable departures from the methods prevailing among carriage and wagon builders.

The use of metal in place of wood is one of the innovations brought about. We now frequently encounter bodies constructed with steel or iron frames, and, besides this, the use of sheet aluminum is becoming fairly common for the backs of seats

and in other places where it once was the practice to use bent wood.

A typical automobile body of the best grade is nowadays built on a steel and wood framing, with aluminum or other sheet metal for the sides and backs of seats, panels, etc. Wood and glue are used but sparingly. In fact, there seems to be a growing tendency to use only enough wood to hold the tacks and nails that attach the upholstery. This plan of construction minimizes the possibilities of fire, warping, breakage and other injury, and also lends itself to more elaborate and more uniform standards of construction. Where aluminum is used, the most difficult curved and belled shapes, particularly in tonneaus, are readily produced by hammering the metal over forming blocks of proper shapes.

Automobile upholstery is generally but little different from the best grades employed in the furniture and carriage trades, the same materials and similar details of construction prevailing. Fine steel coil springs, the best of coiled hair, and leather and fabrics at once handsome and durable, are used almost to the exclusion of all other materials. Some attempts have been made to introduce pneumatic cushions in automobile upholstery, and the innovation has much to commend it, lightness, durability and comfort all being thus secured.

A tendency that has of late become pronounced is the use of detachable dust covers, of denim or canvas, made accurately to protect the seats and backs and fastened in place by straps and buttons. Many machines are now seen thus equipped. The finish and binding of the edges of automobile upholstery are also much advanced beyond the methods in vogue for other purposes. Edging of small brass tubing, filled with lead and disposed with an eye both to the artistic and the practical, is very common.

As to the future of the types of bodies that now seem to be becoming so definitely established, much must depend on the developments in the engineering details of the automobile. For it must not be forgotten that the superstructure is secondary to a machine, changes in which may necessitate an entire revolution from the body forms to which we are becoming accustomed.

In Germany it is customary to open automobile events, such as shows and conventions, with poetic (or rhymed) effusions. On a recent occasion a poem by Frau Hartl-Mitius was recited, which dealt with the auto topics of the day and attempted to administer a rebuke to those who had been making so much ado about the Paris-Madrid disaster, in something like the following terms: "Has any progress ever been made without struggle and sacrifice? Did not Franklin die to give us the lightning rod?" Frau Hartl-Mitius is rather weak in her history, and the logic of her implied deduction isn't much better.

LESSONS OF THE ROAD

An Eventful Run in Mountainous Western Pennsylvania.

By B.

In reading the road experiences of your many contributors, I have frequently wondered at the placid contentment with which the majority seem to accept the annoyance of breakdowns of all descriptions, many directly the fault of the construction of their cars. It seems to be accepted as a matter of course that faulty design, poor workmanship and bad material shall be the rule, and seemingly most users are disposed to make the best of it and not seek to improve their condition.

I recall several instances in very recent issues of *THE HORSELESS AGE*, as, for example, one user of a gasoline runabout had to renew his cooling water every 5 miles, and, as he did not have any other trouble to speak of, thought he could well afford to stand that one. Another ran 35 miles without incident except stops for oiling. Now, I am in the habit of going from 30 to 50 miles without leaving my seat for any purpose, and should think a car which would not take care of its own lubrication for at least the latter distance was too much trouble to bother with. Another man made a railroad journey from Maine to New York city and back in order to obtain a replacement for a broken connecting rod, yet calls his car "a deservedly popular make."

Now for my own experience. I have owned a number of steam carriages and now have a gasoline touring car, being in my fourth season of active automobiling, and feel justified in saying that it is not necessary either to pay for an imported French car or put up with wretchedly poor design and workmanship. In one of your issues of December last you printed an account of my experience with one of said steamers, and I can add that I went on

during part of the past summer, taking many one day trips around this very rough country, and always getting home in time for the appointed meal, never having to even pump a tire on one of those trips. I often said my luck was too great to last forever and that some day Nemesis would overtake me, but on the morning of July 24 I started out with my good friend and frequent companion, Mr. H., with no foreboding that I had reached the fated day.

ON AN EXPLORATION TRIP.

H. and I had together tried many different ways of reaching Butler from Pittsburgh, and on this morning started with the express intention of testing one or two variations of one of these routes, with a view to its suitability for a club run. We went through Highland Park, crossed the Allegheny by the Sharpsburg Bridge, and up onto the piked county road along the ridge back of Etna. Here we came upon a heavy steam roller which had been run over the bank beside the road by a careless engineer, who, after stopping to fill his water tank, started up again with the valve closed in the pipe to his steam steering gear, and was off the road before he found out he had no control of same. We had happened along there several days before just after this had occurred, and H. secured a view of the roller (Fig. 1) overhanging the edge of the bank, with the tank resting on the ground. The same night there was a heavy rain, which washed the earth from under and let the machine down into the ravine. On the morning of July 24, when we reached this point, a gang of men were busy jacking and blocking up the monster, in an effort to get her back on the road, and H., of course, snapped the scene.

In the background of the view, Fig. 1, where the road bends to the right, can be seen a branch leading off to the left. This we took, leaving the "pike" and taking to genuine country mud road for most of the balance of our trip. Following this for 3 or 4 miles we reached a school-house, where there were three roads to choose from. The one to the left we were



FIG. 2.—A ROAD IN THE WOODS.

familiar with, and would take us to a point on the "Three Degree Road," which was our objective route, somewhat to the south of where we were, while our path would thence lie northward. The middle road was short and direct across country to the "Three Degree," but not being in line of much travel was likely to be rough. The right hand road, according to the county map we had, led directly toward where we wanted to go, and having never been over it we unanimously decided to try it, especially as it looked smooth, well traveled and inviting.

ROAD DIFFICULTIES BEGIN.

A very short distance along it we came to a farm lane, along which about half the traffic seemed to turn, and the same process being repeated two or three times soon brought our good road down to a very rough, stony track, with the country getting wilder all the time. Then we came suddenly on a fork, one branch going steeply up the hillside, and the other just as abruptly down. Without stopping to consider I shoved the tiller to starboard and took the down track, but in a few yards was brought up by the prospect ahead, together with an exclamation of "For goodness sake!" from H., who at once jumped out and started up the hillside on foot to explore the other path. The



FIG. 1.—A HEAVY STEAM ROLLER WHICH HAD BEEN RUN OVER THE BANK.



FIG. 3.—IN THE WESTERN PENNSYLVANIA OIL DISTRICT.

one in front descended into the bed of a small stream of water, between two fences, and looked like the outlet from the rear of some farmyard.

I tried to back up the rocky trail to the fork, but our generator was of the type "the more speed the more steam," and as we had been picking our way with much caution for some time the pressure gauge was decidedly drooping, and I had to resort to the hand pump to get enough water into the boiler to climb the grade, which was quite as severe after switching into the other fork of the road. I kept on for some time, slowly picking my way through gullies full of roots and stones of all sizes, with no sight of H., who had gone well ahead. Then I began to get among signs of a Western Pennsylvania oil district, and finally saw H. trudging back toward me, with camera over his shoulder. He called out that he "guessed" we could get through, at the same time casually dropping a big rock into a hole gullied out by rain water, under the root of a tree which ran directly across the only place my left wheels could pass. He then dropped in behind, and I did not know until a week later that he was "shooting" the view Fig. 2 herewith. By close inspection of the picture, the hole, stone and root can be made out in the rear of the rig, which had passed them a few feet when taken. He then got in and we soon came out into an opening in the woods where someone had planted a field of grain, plowing up road and all, and we had to turn to the right and skirt around the edge of the field for some little distance.

IN THE OIL COUNTRY.

Then we came upon active oil operations. To our right hand was a boiler under a shed, steaming away entirely unattended, while still farther away, to the left, was a derrick engaged in drilling, the steam being carried by a pipe laid under the ground from the boiler to its engine. As we were evidently on the crown of a rather high hill and any way down it was likely to be steep and rough,

I visited the gang at the derrick for advice and information. They said there was a road that they used with their buckboard, but advised me to turn off over the hillside, down into a farmyard, when I came to a "big pile of stones in the road." As I walked back to our wagon, H. snapped me from the other side of it, as you may see by close examination of Fig. 3.

I started down hill, H. walking, to lighten the load to be held back, and the track was so rough that my eyes were kept pretty closely in front, and I did not see the drillers' "pile of stones" until almost upon it. I instantly turned off the side of the road without stopping to ask whether the hillside was "over 50 per cent. grade," and just as the rear wheels jumped the ridge at the edge of the track my

FOOT SLIPPED

off the pedal. I had my hand on the lever of the hub brakes, but still she got a little start on me, and when my foot brake went on again it locked the rear wheels, and they started to skid around to the right on the damp ground under the trees. I felt rather than thought that if she got far enough around she would simply roll sideways down that hill, and instinctively yanked the tiller so as to bring her head as straight down the slope as I could get it. By the help of luck or of Providence she had not gotten too far around, and she slid and scooted the rest of the way down to an easier grade, and then through a fence into the farmyard our oil well friends had mentioned.

After picking up H., who was thankful to have any rig to ride home in, instead of leaving it smashed up among the trees on that hillside, we rode out the farm gate into a road which I at once recognized, though we had only seen it once before. In less than a quarter mile a man plowing in a field near the fence informed us that the bridge was down at Idlewild, so we turned back the other way and soon struck the old "Three Degree" just at the foot of the bad, rough hill, around which we were seeking a better way. As it was impossible to get past to the east, we turned off

the Three Degree road to the left and went up the creek valley some distance to another road, over which we had been once last year, but whose comparative excellence we did not fully recall. On the way we encountered a large tree which had been blown across the road by a recent storm, bringing down with it a pole and number of telegraph wires (which line, by the way, affords a sure guide via the Three Degree all the way from Perrysville into Butler), and leaving little room to get past along the side of the road. On the way up this valley we came upon an old mill, with a peaceful scene at its door, which was too much for H.'s artistic instinct, and we had to stop to "get" it.

STILL STEEPER.

When we came to old Salem church we had to turn sharp uphill to the right, and at once found a grade which required hand pumping of water to surmount, and before we got through with it we were well satisfied that the bad hill on the "Three Degree" was by far the least of the two evils, and we should advise our clummates to stick to the telegraph line right through. We got lost in trying to return to the "Three Degree" at the top of the hill, and had to inquire at a farm house, and when at last we did find the old road we felt as if it was a good friend.

By this time it was noon, and if we were to get lunch at Bakerstown we must hurry along. But to get there we had to leave our "Three Degree" friend, and when the branch was reached I did not recognize it, and when stopped by H. I had run past the fork, keeping to the left, while along the other road was coming a buggy, the occupants of which we decided to wait for to ask directions. When they came up they proved to be an elderly man, driven by a boy of perhaps seventeen, and the horse we afterward learned was a half broken five year old.

We were standing still, the wagon perfectly silent, with fire turned off. The horse came up within about 100 feet of us and stopped, when the boy struck it a violent blow with the whip, and it then



FIG. 4.—SCENE OF RUNAWAY.



FIG. 5.—WAITING FOR LUNCHEON.

passed us at a gallop, bearing away to the left to get as far as possible from our machine. This took their left wheels up the bank next the fence, and as they were at the same time turning a corner into the "Three Degree" road the

BUGGY UPSET

to the right, throwing both occupants into the road, while the harness went to pieces and the horse ran out of sight. The boy was not hurt, but badly frightened, and kept saying "Oh! the old man!" The latter was very self possessed, said he did not think he was hurt, and asked for his glasses, which I found in the dust. The skin of his face was much torn about the right eye, and the blood made it impossible to tell how serious the injury was. I suggested that I accompany him to a farmhouse a short distance back along the road we had come, which I did, first suggesting that he get in my rig and ride there, but he preferred walking. The farmer's wife met us at the gate with many exclamations, addressing the sufferer as "Alex," and gave him water to bathe his face, while the farmer came up with the information that the runaway horse had been caught, and that one of his own was being hitched up to take the old man to a doctor. I again offered my rig, but they did not seem anxious to try it. The man said he did not blame me, but would like my name and address, which I gave him, also telling him to send me his doctor's bill (which I may say in passing I paid, to the amount of \$11.50, all because a boy struck an unbroken horse).

I returned to H. and the rig, which he had meanwhile photographed (Fig. 4) in the position it was all through the incident. The righted buggy can be seen just at the junction of the roads where we left it. As we were about leaving the old man and another came along in a buggy, the former driving, and went on by the "Three Degree" toward Valencia. We proceeded by the other road to Bakerstown on the "Butler plank," where we took lunch at a house H. had discovered a few days before on another trip. The man of the house was an elderly Scotchman wearing a pair of large rubber boots, and while he entertained me with his experiences during three years on the London police force H. shot us from rear (Fig. 5).

BOYS EAGER TO HELP.

We had come a little over 30 miles during the morning and had less than 20 to take us home again, over roads perfectly familiar and for the most part good, of plank, macadam and paved streets. After lunch and a rest we fired up again, and started home in leisurely fashion, stopping at a pump in front of the village store for a few buckets of water, as a matter of precaution rather than necessity. The small boys were very attentive, and one of them insisted on doing all the pumping (Fig. 6).

We went on along the plank road and had made about 3 miles when we coasted



FIG. 6.—THE VILLAGE PUMP.



FIG. 7.—LEFT IN THE HOSPITAL.

down an easy grade onto a bridge over a stream. I always strike these bridges at a slow pace, as there is often a bad bump, and it was certainly well I did so in this case, for, just as we were fairly on the bridge floor, the right front wheel turned sharp out under my astonished eyes, and, although I instinctively pushed the tiller hard the other way and jammed on the brake, it pulled the rig around to the right until the tire came against a heavy log at the edge of the floor, which kept us from going over into the run. As the headway was not yet killed, the wheel was forced under the wagon, breaking off the wooden reach, and that gone, the right end of the axle was badly bent aft before coming to a dead stop. H., who had been sitting cross-legged in a state of great ease, straightened up and inquired in a dazed way, "What happened?" I did not quite know, but soon learned on getting out to look.

STEERING GEAR DISCONNECTED.

In this wagon the distance rod connecting the two steering knuckle arms does not embrace the latter directly, as is common, but is hinged to the top of a pin at each end, which pins in turn sit in the eyes of said arms. They lie there by their own weight, and are prevented from jumping out by a cotter pin through the lower end, below the eye. I found that this cotter pin had sheered off by the constant jarring of 4,000 miles use, the two thicknesses of cotter being still in the hole in the pin, with ends gone. How long it had been so I have no way to tell, but finally the pin jumped out of the eye of the steering arm, leaving the right wheel free to turn. Had it done so at a time when running fast we could hardly have escaped a serious accident. There was nothing actually broken except the hickory reach, but the axle was bent back and downward, the right spring forced back and its bolts pulled partly through the horn of the body sill, and though H. was for trying to get a blacksmith a mile back to help us fix her up, I had little hope of success.

LEFT CAR IN A BARN.

While considering a car of that "deservedly popular" make came along and

lent us a jack, with the aid of which we pulled the wheel back straight, and recoupled the distance rod, and then pushed her into a barn close at hand, where H. took a last snap of her by the sunlight streaming through the cracks in weatherboards (Fig. 7). We left her to the chickens, and started out to walk 3 miles to the railroad, but when, after tramping a mile through heat and dust, we reached Talley Cavey, a better idea struck H., and he telephoned home for a car to "come out and get us." We sat in the shade for about an hour and a half, when there hove in sight what proved to be H.'s tonneau car of same build as my stanhope, driven by the head mechanic of the repair shop, so we got aboard and ran back to give him a look at the wreck. We all agreed that the best thing to do was to send out a new front axle and reach, and put them in where she was, which would enable us to run her home; and the following Monday I accompanied the repair gang to the spot, and after about three hours hard work had the satisfaction of running home myself, on the same supply of water, fuel and oil that was in her. Meanwhile we set out for home in the touring car, and arrived there in a little over one hour without any incident worthy of mention.

FIRST "STRANDING" IN 4,000 MILES.

Thus it came about that for the first and only time so far I failed to reach home in my own rig from any of the little country runs which I have found so enjoyable and health giving. To prevent a possible repetition of this trouble I tried to put a nut on end of that pin, but found it hardened so that a thread could not be cut, so contented myself with putting a leather washer under the cotter pin so as to take up all lost motion, and prevent the jumping and striking; and at the same time give a soft surface instead of a steel cutting edge in contact with the cotter. The peculiar design of this steering gear was undoubtedly the cause of this accident, as the momentum of the distance rod jumping on rough roads was enough to gradually cut off the cotter, while the usual method of having the forked end of distance rod embrace the

steering arm leaves nothing but the coupling pin to jump; but even then it would be better practice to use a nut with cotter instead of depending on the cotter alone. However, the wagon ran about 4,000 miles before this happened, and probably a little closer scrutiny on my part would have detected the cutting in time to replace with a sound cotter, so I am not entirely free from responsibility myself.

Chicago-New York Day and Night Record Run.

The 24 horse power Columbia touring car which left Chicago at 4 a. m. on Monday, September 28, arrived in New York at 9 a. m. on Thursday, October 1, thus having covered the distance of 1,177 miles in three days five hours. Following are the times of arrival at the various larger cities en route and the distances:

Start from Chicago, Monday, 4 a. m.; Elkhart (129 miles), 9:40 a. m.; Waterloo (194 miles), 1:10 p. m.; Toledo (296 miles), 6:30 p. m.; Cleveland (422 miles), 3:40 a. m., Tuesday; Erie (528 miles), 10 a. m.; Buffalo (626 miles), 3:25 p. m.; Binghamton, 10:45 a. m., Wednesday; Hudson, 9 p. m.; New York (1,177 miles), 9 a. m., Thursday. During the last night's run the driver, Holcomb, lost his way in New Jersey, and arrived in New York by way of Tuxedo and Paterson.

Endurance Run Notes.

In addition to the entries published in our last issue a car has been entered by the St. Louis Motor Carriage Company.

The Erie Chamber of Commerce has extended an invitation to all participants in the endurance contest to be present at a meeting at 911 State street, Erie, Pa., on the evening of October 12. The subject of "good roads" will be discussed and an address will be made by L. C. Boardman, vice president of the New York and Chicago Road Association. The automobilists of Erie will act as a reception committee.

Following is a list of the officials of the endurance contest and of the hill climbing and brake trials: Board of examiners for endurance contest—Henry Soutter, M. E., of Hartford, Conn.; L. A. Shepard, M. E., chief engineer for Cornelius Vanderbilt, and Fred H. Colvin, president of the Derry-Collard Company, New York. Harry H. Croninger will act as starter. The officials for the hill climbing contest are: W. C. Temple, referee; D. L. Gillespie and George H. Flinn, timers, and Harry A. Ross and J. McD. Mashey, measurers. The officials of the brake tests are: W. H. McNimick, referee; George I. Hailman and James Francis Burke, timers, and Chas. H. Dixon and Howard Booker, measurers. All the officials of the hill climbing and brake tests are members of the Automobile Club of Pittsburgh.

COMMUNICATIONS.

An Opposition View of the Selden Patent and the Licensed Association.

DETROIT, Mich., September 28.

EDITOR HORSELESS AGE:

So far as our plan of action is concerned for the future it is extremely simple. We intend to manufacture and sell all of gasoline automobiles of the type we are constructing that we can. We regard the claims made under the Selden patent as covering the monopoly of such machines as entirely unwarranted, and without foundation in fact. We do not, therefore, propose to respect any such claims, and if the issue is forced upon us, shall defend not only ourselves but our agents and customers to the fullest extent, and this, too, without regard to whether or not we join any combination for the purpose of defending against said patent.

In taking this stand we cannot conscientiously feel that Mr. Selden ever added anything to the art in which we are engaged. We believe that the art would have been just as far advanced today if Mr. Selden had never been born; that he made no discovery and gave none to the world; if he did it was a narrow and impracticable one, having no value, and that he and his assignees cannot monopolize the entire trade by forcing upon it an unwarrantable construction of his claims by those interested in sustaining them.

With regard to the assertion made by the so called Licensed Association—they come to us in a multiplicity of forms. A certain trade journal published a supplement, which purported to set forth fully the object and basis of the association. After reciting that five decrees had been entered by consent it further stated:

"It will also be noticed that in every instance the court decided in favor of the patent."

A purported interview with a representative of a certain Eastern paper, published at Hartford, Conn., with the patentee, George B. Selden, is published, and copies thereof have been mailed from New York to us, and other parties have received them from the same source with this interview marked. We are warranted in believing that such publication and sending of marked copies to those interested were the work of the Licensed Association.

In this interview Mr. Selden is made to say, among other things, that the question of invention has been entirely foreclosed by the decisions of the United States courts that a preliminary injunction would be granted upon merely proving infringement; that the court would never hear any argument or evidence tending to show that the patent was invalid. This is in di-

rect line with the statement made in the publication heretofore referred to.

We are informed by the highest authority that these statements are absolutely false; that the courts never regard consent decrees of any value whatever in establishing a patent, and that they would form no basis whatever upon which claims for a preliminary injunction could be made.

The same authority also states that every reputable lawyer in the United States, engaged in the practice of law, knows this principle.

A large number of advertisements have been published in which it is claimed that the Licensed Association members are pioneers in this art. They do not say explicitly that they are the pioneers, but that is the inference. As we know to our certain knowledge, a number of members are not pioneers in any sense of the word whatever; some of them began the manufacture of such machines within the last year. Our Mr. Ford is one of the pioneers, as he built the third gasoline automobile machine in the United States. Therefore, the inference sought to be conveyed that only the licensed manufacturers are pioneers, and especially the statement that each and all of them are pioneers, is not true.

A further assertion is made in the same advertisement that they own about 400 patents, with the implication that these patents are, or most of them, fundamental to the business. We happen to know that some of them are of very little value and that they pertain to tires and incidental things.

Further, we are informed by the highest authority that there are in the neighborhood of 2,000 to 2,500 patents, which cover various branches of this industry, and which are in the classes to which the 400 belong. It is perfectly evident, from the attitude of the association, that they would have the public believe that their 400 patents must override the other 2,000 which they do not own.

It is further claimed that they are making 90 per cent. of the gasoline automobiles. We are not now in a position to state whether this is true or not, but we are endeavoring to do our level best to reduce the per cent.

In the same article, taken from the supplemental number of said paper, it is alleged that specific defendants, after spending a large amount of money in stubbornly contesting cases, have joined the association, with the implication that they had seen the futility of defense. We have it from the best of authority that the association itself, by its contract with one of these parties, refunds or pays by remission of dues, all of the expenses incurred by it in defending against the Selden patent.

It is evident from the foregoing that the association is not a philanthropic institution. It is in the business to make money at the expense of five or six times as many competitors, and that its members have

joined together because of some expected pecuniary benefit in monopolizing the market under cover of the Selden patent, and not because they believe the patent to be impregnable. This is undoubtedly the truth, as is evident, because up to this date, although repeatedly challenged by outsiders and ourselves, they have brought no action since the association was formed, that we can learn of, against an alleged infringer. They are no nearer establishing the Selden patent as a monopoly than they were last April, when they were challenged to bring such suits. This is not diligence on their part, but conclusively shows that the advertisements which they are putting out are intended to influence the public and are a substitute for the proper tribunal—the courts.

In stating our attitude with regard to these mendacious statements and the position of the Selden Association before the automobile public, we are confident that we are voicing the opinion not only of ourselves, but of all of the outside concerns, in stating that they do not inspire us nor the outside concerns with any degree of confidence in the equity of the association or in the bona fides of their claims.

If sued as to defenses:

First—All the defenses heretofore set up in any of the cases that have been compromised are just as available in any new suit as they ever were in any of the old ones.

Second—Our attorneys have matter which is very material to a defense which has not been set up or shown in any case, and we do not believe it has been considered by any of the attorneys that have acted in behalf of the Selden patent.

FORD MOTOR COMPANY,
J. Couzens, Secretary.

The Cooling Problem.

Editor HORSELESS AGE:

The writer of the article on the cooling problem in your last issue attacks a subject of considerable importance, and draws some conclusions of value. However, he makes some rather serious blunders. With your permission I would like to point out a few of these for the benefit of your readers.

He correctly enumerates the reasons why the motor should be cooled, and after so doing he says: "The first point in keeping the motor from becoming too hot is to have the cylinder made of so poor a conductor of heat that it will abstract the least heat possible from its contained gases." Here he confuses the matter of conduction with the matter of convection, which is a very different thing. The amount of heat which passes from the contained gases to the cylinder wall has little relation to the conductivity of the metal of which the cylinder is composed. This action is governed by the laws of convection and radiation, and will depend therefore upon the quality of the surface of the

inside of the cylinder, the temperature of the enclosed gases, and the speed with which they pass over the cylinder wall. It is only after the cylinder wall has received the heat that its conductivity comes into play. This conductivity should be as great as possible, and should continue without interruptions to the cooling surface, whether that be an air cooling surface or a water jacket.

This matter of a non-conducting cylinder wall is rather attractive, and several United States patents show a cylinder wall lined with a non-conducting material. Let us examine the results of such a construction. The explosion of the gases in the cylinder will heat the surface of a non-conducting lining, and since it is a non-conductor all the heat will remain at the surface. Some of this heat will be given up to the new charge of gas which comes in, but in the course of a very few explosions the surface of a non-conductor will become so hot that it will set fire to the incoming charge of gas—just the thing we sought to avoid. There probably is a happy mean in this matter, and it may be that certain parts of the inner surface of the cylinder wall may be covered with an insulating material. Without ever having tried it, I am disposed to think that the cylinder side of the exhaust valve head might be covered with such material with theoretical advantage. The practical difficulties of attaching an insulating material in this position would be great. I agree with the writer that iron and steel are about the only practical materials for making a cylinder.

In dealing with the transmission of the heat from the radiating surface to the air he falls into another error. Here again it is largely a matter of convection, and, as he has not mentioned convection at all in his article, it may be as well for me to define it as the process by which heat is transmitted from a solid to the air by actual contact, or the opposite process.

As far as radiators are concerned which are surrounded by still air he is correct that the radiating surface, both in its consistency and color, is of considerable importance, but in radiators on automobiles where the air is rapidly passing over the radiating surface, convection is so much more important than radiation that he is entirely at fault.

He is quite correct in saying that a surface covered with lampblack is a very good radiator, but the lampblack itself is so bad a conductor of heat that its free surface becomes relatively far cooler than the surface in contact with the hot metal. The same fault may be found with his suggestion that a dark colored paint be used to cover the radiating surface. Again, he omits altogether to mention, what most good authorities state, that rusty cast iron is one of the best radiating surfaces which we know of. In practice I have found for water radiators that almost ideal conditions may be obtained in the following

manner: The flanges of the radiator are composed of copper and these are treated chemically with an oxidizing substance after the same method that is used in making ornamental copper fixtures for door bells, etc. The result is a uniform, velvety, black surface, which is composed almost entirely of copper oxide, the film of copper oxide being extremely thin, and an excellent conductor as well as radiator.

DR. HENRY POWER.

A Wall from Mexico.

CITY OF MEXICO, September 22.

Editor HORSELESS AGE:

The development of automobilism in this country began at an early date, but many retarding influences have made themselves felt. There are three obstacles particularly to the further development of the sport in this vicinity, as follows: (1) Our city government; (2) the Waters-Pierce Oil Company, and (3) the absolute lack of good roads and nearly absolute lack of garages and repair shops.

The city administration has just passed a most ridiculous and outrageous ordinance to regulate the operation of autos in the federal district. First of all, there is a monthly tax or license fee of \$8 to be paid. Then, on making application for license, the owner of the car must furnish two personal photographs, one of which is fixed to the license certificate for purposes of identification and the other filed away by the city government. Finally, an examination has to be passed, and the applicants must be pronounced competent mechanics before a license is issued to them. The other sixteen paragraphs of the ordinance are similar to the above. Agents and dealers in autos are also required to obtain a license. It will be apparent that the monthly fee makes automobilism a very expensive pastime in this city.

The Waters-Pierce Oil Company are our next enemy, they requiring us to pay \$4.75 for a 5 gallon can of so called 74° gasoline, or \$4.50 for the same size can of fairly good kerosene. Lubricating oils can only be obtained from this same concern and are of poor quality and exorbitant in price. All of the above supplies are made right here. This high price of supplies is, of course, another factor tending to make automobilism an expensive luxury.

Finally, the almost complete lack of garages and repair shops is the cause of many annoyances to automobilists in this city, and I am convinced, Mr. Editor, that there is a very profitable field here for an enterprising concern with small capital to start a regular garage and repair shop for all kinds of machines. Such an enterprise would fill a long felt want, would promote the sales of automobiles, and have a good opportunity for considerable pecuniary benefit. There are now three repair establishments here, but they make outrageous charges for any kind of repairs, even for adjusting a valve. Their bills are never less

than \$15, \$20 or \$30, and sometimes the amount is twice as much. As much as \$3 has been charged for repairing a tire puncture. The result is that people dread the repair charges more than the first cost of the vehicle.

A good deal of the blame for the unsatisfactory state of affairs here rests with the manufacturers themselves. Most of them simply send to their customers a few sheets of typewritten instructions, stating "things to do" and "things not to do." A buyer of an automobile can hardly get along with such rudimentary instructions; he falls into the hands of the so called experts, and is soon confronted with their exorbitant bills. The manufacturers should issue booklets with full and complete instructions for operating and caring for the machines and for making the simpler repairs. The White Sewing Machine Company, the Reading Automobile Company and the Locomobile Company have done this very nicely. The latter concern has even gone to the trouble of issuing a very correct translation of its instruction book in Spanish, which must have been a great aid to its business in this country, and people here fully appreciate its efforts in this respect.

In view of all the difficulties with which automobilism is beset in this country, the writer would ask your valuable and instructive publication, in the interest of many actual and prospective owners of automobiles in this city, (1) to influence American automobile manufacturers to issue booklets containing full instructions for operating their machines, for giving them the proper care and for making the simpler repairs; (2) to call to the attention of all competent and enterprising mechanics in the United States that there is an ample field in the City of Mexico for at least two new large garages and repair shops, comprising, of course, a small plant for charging electric vehicles.

When the people of Mexico City learn of a place having been opened where the charges are not unreasonable they will patronize it, and the sale of autos will increase rapidly. X. Y. Z.

Finger Lameness and Tiller Steering.

READING, Pa., October 3, 1903.

Editor HORSELESS AGE:

The articles on "Finger Lameness" due to tiller steering emphasizes the necessity of a controlling device that will permit relieving either hand part of the time. The wheel steering is decidedly better than the tiller in this respect, for when one hand is not needed on some other part it can be used on the wheel, relieving the other hand. How much better, however, is a vehicle that can be absolutely controlled mile after mile with a single hand, and either hand at that. With such a method of control there is no occasion to tire or strain one's muscles, and automobilism is a pleasure in every sense of the word. It is our belief that the public will finally learn these facts

just as we have learned them years ago, and after they have paid for their experience will accept the results we are offering them free. C. E. DURYEA.

European Record Tour.

LONDON, September 24.

Editor HORSELESS AGE:

I think it would interest you to know that C. J. Glidden has just completed his world's record tour from Liverpool to Niska, near Lapland, including crossing the Arctic Circle, via Helsingborg, Jonkoping, Stockholm, Gelfe, Sundsoall, Ornskoldersk, Ulmea, Skeftea and Lulea, and returning by way of Aalborg, in Denmark, through Flensburg, Hamburg, Berlin, Dresden, Carlsbad, Marienbad, Prague, Vienna, Salzburg, Ober Ammergau, Brengenz, Neuhausen, Belfort, Paris and Calais, has returned, and is stopping at the Carlton Hotel. Probably you would get some really interesting information from him, and there is no doubt his journey is a very unique one in automobilism. Here-with is copy of his latest postcard:

"BRUSSELS, Belgium, September 22, 1903. —Rather rough on the motor, after driving 6,000 miles on all kinds of roads, to drive 100 miles today on the wretched paving of Belgium in six hours, but not a nut loosened or joint separated, and it's a better Napier today than it was when new. Fifty-one day's run; total mileage, 6,185 miles; 363 hours actual running time; seventy-seven hours' rain; six punctures; delays, one-half hour.—(Signed) C. J. GLIDDEN."

S. F. EDGE.

Shortsighted Fair Management.

BROCKTON, Mass., September 30.

Editor HORSELESS AGE:

Visiting automobilists at the recent Brockton fair were very much disappointed in not being allowed to enter the grounds, except in a small, fenced off plot back of the buildings, where no view of the races could be had, while tally-hos and drags were allowed in the oval. Several cars from Boston turned back and returned to the city. This is the only fair in the East in which automobiles are excluded, and the shortsightedness of the management in letting a few horsemen dominate the policy of the society is the cause of considerable adverse criticism among patrons. N.

Wonderful Braking Power.

GARDNER, Mass., October 2.

Editor HORSELESS AGE:

I enclose an article from a recent issue of the Boston Herald. You will note that Mr. Wallace's car is fitted with two brakes and "can be stopped in twice its own length when going at 60 miles an hour, which fact has been sufficiently demonstrated."

Has anyone seen anything of Wallace since he "sufficiently demonstrated" this fact, or did he fly off the earth on a tan-

gent to become a mere satellite revolving in space? A READER.

[The article referred to is one of the kind we often find in country papers, relating how Mr. So-and-so has bought a car which is the finest and the fastest in the State or the county, and that it is one of the only three or four that have ever been made. We do not question the possibility of stopping a car going 60 miles an hour in twice its own length, but do not believe the car would survive a demonstration of this kind. A car going at 60 miles per hour has enough energy of motion stored up to raise it vertically into the air 121 feet. Even if the brakes should be powerful enough to instantly lock the wheels the car would slide along a level road at least twice this distance. Only some obstacle of the nature of a brick wall could cause it to stop in twice its own length.—Ed.]

Cushion Tires.

ONTARIO, N. Y., September 26.

Editor HORSELESS AGE:

Can you or any of your readers state what the experience of users is with non-puncturable tires?

Have they sufficient resiliency to save a car from damaging shock and to render reasonable comfort to the passengers?

I refer to the non-pneumatic variety of tire, several of which are advertised in the trade journals.

M. L. F.

[We should be pleased to learn of the experience of readers with this type of tire.—Ed.]

Handicapping Formula.

Editor HORSELESS AGE:

The automobile handicap race at the Empire City track on October 3 represented what is believed to be the first attempt ever made to handicap the contestants on a strictly scientific basis. A formula was used in which the probable efficiency of the motor and transmission gearing, the hub friction, tire resistance and wind resistance were all taken into account, and the presumptive speed of the car calculated on that basis. The formula had never been applied before to track racing, and the result of the Empire track race showed the need of some modifications in it. In particular, it does not well apply to cars geared too low to develop their full track speed.

The handicapping committee has under advisement both the minor changes needed fully to adopt the formula to cars geared for racing, and also the question of providing for stock touring cars and runabouts with regular gears, to the end that all may have an equal chance. There will be a handicap race at the Brighton Beach meet October 31, in which much improved results are hoped for.

HERBERT L. TOWLE.

NEW VEHICLES AND PARTS.

Packard Ignition Cable.

The Packard Electric Company, of Warren, Ohio, have developed a special cable for wiring automobile and stationary gasoline motors. The cable consists of forty strands of No. 30 tinned copper wire, equal in carrying capacity to a No. 14 solid conductor, but greatly superior on account of its flexibility.

About these forty strands of conducting wire are woven two layers of cotton thread. After each weaving the cable is passed through a bath of insulating liquid and baked in a steam heated oven. Next in order come several layers of specially prepared tape, the number of thicknesses used depending on the service for which the finished cable is designed. Each layer of tape receives two baths of insulating liquid and two bakings before being wound upon the cable, and one bath and one baking after being wound in place.

In order to make these layers of special insulated cloth flexible, they are wound about the central core in opposite directions. The insulating liquid when baked upon the tape assumes an elastic state, which materially assists the flexibility of the cable without being in the least affected by heat, moisture, oil or grease.

Upon the outside of the insulating tape are woven two layers of braid, each one going through the same process of baths and bakings as the previous layers. This gives the cable a neat appearance, and at the same time, by reason of every pore being filled with a glossy coating of insulating liquid which is impervious to moisture, it has stood some of the most severe tests in very trying places most satisfactorily. As a notable evidence of this the run of the Packard motor car from San Francisco to New York is mentioned, in which the high tension wire passing beneath the motor mechanism was coated with a thick layer of dust, grease and oil. By scraping off the foreign matter and cleaning the cable with gasoline, the outside braid was discovered in as bright and good condition as when placed upon the car. The action of the oil over a distance of 4,000 miles had had absolutely no effect upon the outside coating of insulation.

This cable is at present made in two sizes—No. 3, the one for primary current, having three layers of the insulating tape, and No. 6, the one for high tension or secondary current, having five layers. Repeated tests are said to have shown that it requires from 18,000 to 20,000 volts to break down the insulation upon the No. 3 cable intended for primary use. The company's maximum testing capacity of 30,000 volts has not been sufficient to break down the insulation upon the No. 6 cable with its five layers of insulating



SINGLE CYLINDER WATERLESS KNOX RUNABOUT, WITH FOLDING SEAT.

tape. The best rubber covered wire obtainable on the market will not stand the heat, steam, oil, grease and water to which it is often exposed on motor cars and gas engines, and the Packard Electric Company claim that their special cable meets these conditions perfectly.

Knox 1904 Models.

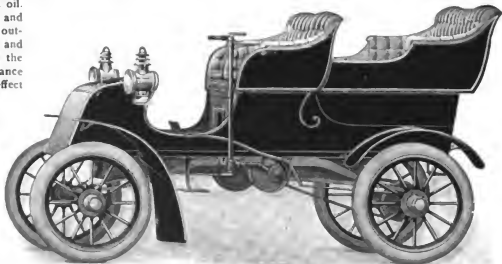
The Knox Automobile Company have five new models ready for the 1904 market, regarding which they furnish us the following information. Three of the new models have single cylinder engines and closely resemble the 1903 car in their mechanism, but show a number of detail improvements. These cars are a runabout with folding seat (Fig. 1), a detachable tonneau touring car (Fig. 2), and a survey with detachable rear seat.

The runabout is of the same general style as the 1903 model, with several improvements, among them being a dash on the front footboard, which affords protection to the passengers on the front seat,

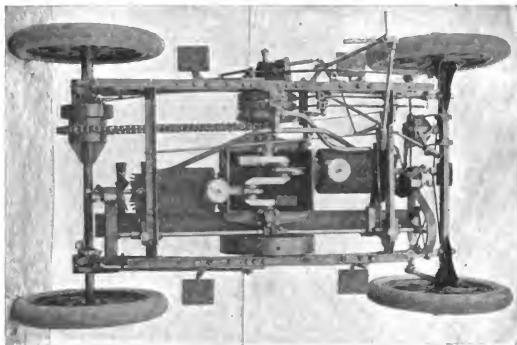
radius rods, divided seat and the Lemp patent steering check. This check will be a standard equipment for all Knox cars for 1904. The specifications for the runabout are as follows:

Engine cylinder, 5 inches in diameter and 8 inches stroke, air cooled by Knox patent corrugated pins and forced draft system; gasoline capacity, 150 miles; wheel base, 6 feet; tread, 4 feet 6 inches; artillery wood wheels, with 30x3½ inch double tube tires; Timken roller bearings on all axles. Ignition is by jump spark system, with eight cells of dry battery, four connected for use and four in reserve. Transmission, planetary system, with chain drive to live rear axle.

Fig. 2 shows the single cylinder tonneau. Aside from the body the specifications differ from those of the runabout only as regards the wheel base, which is 6 feet 6 inches. The single cylinder survey is exactly like the tonneau, except for the rear seat, which corresponds in outline to the front seat. Either of these styles of body allows the back seat to be removed with-



SINGLE CYLINDER WATERLESS KNOX DETACHABLE TONNEAU CAR.



PLAN VIEW OF KNOX DOUBLE CYLINDER CHASSIS.

out injuring the appearance of the car, and customers have a good place to strap on a trunk for touring or any style of a box for any purpose.

To meet the demand for larger and more expensive cars, the company have brought out a two cylinder tonneau and surrey. In general arrangement and details of the mechanism, these cars differ but little from the single cylinder car, except that a second cylinder is added, projecting backward from the crank case, having its own fan, and both fans are driven by a belt direct from pulleys located on the valve shaft, which has been extended for that purpose. The tonneau is detachable and a surrey style of rear seat may be substituted, or, if preferred, a neat touring box may take the place of a rear seat. This touring box is furnished without charge if either tonneau or surrey is bought. Fig. 3, which is a top view of the double cylinder chassis, shows the parts so clearly as to make a more extended description unnecessary.

The specifications for the tonneau and surrey are as follows: Engine, two cylinders, 5x7 inches; wheel base, 84 inches;

double tube; transmission, planetary type, with chain drive to live rear axle; ignition, jump spark; axle bearings, Timken roller; side springs (Knox patent) with swiveled ends. Steers by side lever with improved Kemp patent steering check, irreversible and vibrationless.

Three of these models have been entered in the Endurance Contest, a single cylinder runabout, double cylinder tonneau and double cylinder surrey. The company already have these 1904 passenger cars on the market, as well as two styles of delivery cars.

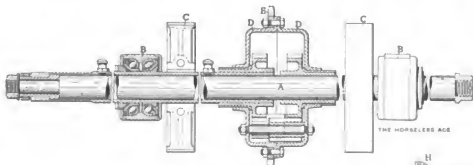
Hercules Light Automobile Parts.

A complete set of running gear parts (as well as running gears complete) has just been placed on the market by Hayden Eames, American Trust Building, Cleveland, Ohio, under the trade name "Hercules." The axles and other parts are suitable for medium weight gasoline cars of the usual speed, for electric runabouts of all ordinary classes, and for light delivery wagons of the usual normal load rating of 350 pounds. Lower speeds will, of course,

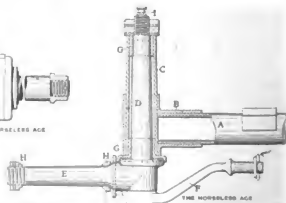
extend determined by other considerations than those of structural strength; it is suitable for application to any vehicle not exceeding in weight 2,000 pounds without passengers) under ordinary conditions of speed and distribution of load. The bar A is provided with oil grooves and two oil cups are provided in the sleeve, as shown, for supplying the lubricant. The track width is ordinarily 53 inches from centre to centre of wheels, but can be varied to suit. The axle complete weighs 83 pounds.

BEVEL GEAR REAR AXLE.

Rear axles are also furnished for bevel gear drive, resembling those for chain drive in every respect except that a bevel gear wheel is bolted to the flange of the differential gear case instead of a sprocket wheel, and the whole driving gear is enclosed in an aluminum casing. This bevel gear casing is journaled on the axle and sleeve with flanged split bronze bushings, one end of each of which bears against the ends of the balance gear case and bearings. Both the gear and the pinion are of hardened steel. There are bearings on the pinion shaft on both sides of the pin-



HERCULES SOLID LIVE REAR AXLE.



STEERING KNUCKLE AND AXLE END.

tread, 5 feet 8 inches; wheels, wood artillery, 32 inches in diameter; tires, 4 inches,

permit the same apparatus to carry proportionately heavier loads, and vice versa.

ion, the casing being provided with bronze bushings. A compression grease cup is provided for the lubrication of each of the four bearings in the drive gear casing. The axle with driving gear complete weighs 105 pounds.

TUBULAR FRONT AXLES.

The front axles of Mr. Eames' running gears are tubular, either straight or curved downwardly in the middle. To the axle tube A are secured the T fittings B, into the vertical branch of which is fastened the vertical standard C of the Lemoine type of axle end. The bushings G G at the top and bottom of the vertical pivot D are of hardened steel, and a bronze thrust washer is provided at the lower end to carry the weight of the vehicle on the pivot. The top of the pivot can be either provided with two nuts and an oil cup I in hole at top of spindle or with brass socket caps and oil cups. The single arm pivot is ordinarily placed at the right and the double arm pivot on the left, and the cross steering connection connecting the two pivots on the front of the axles for all vehicles steered on the left hand side. To provide for all probable requirements in this connection is also supplied a double arm pivot suitable for the right hand side, with cross connection in rear. With this additional pivot any of the above combinations both for right and left hand steer can be provided. This axle can be made of any specified length within reasonable limits, and the spring beds located at any desired point thereon. The pivots E are supplied with stationary cones H H, dust washers, adjusting cones, lock washers and lock nuts in place, but without brass socket caps. This axle is suitable for use under vehicles whose unloaded weight on front wheels does not exceed 800 pounds. The standard wheel track is 53 inches.

JAW BRAKE.

It is often desirable to apply a brake to a faster running shaft than the rear axle, and a brake suitable for application to

countershafts, electric motor shafts, etc. The brake jaws D D are pivoted on a stud C secured to the casting A, provided with a hub B. The jaws are applied to the drum E by means of the lever G, and when not applied are held off the drum by means of the spring F and the set screws H H.

In addition to the advantageous application which this brake has to engine shafts and countershafts, it has been found particularly serviceable on the countershafts of high speed electric motors and the armature shafts of low speed motors. The brake drum E is of cast iron, and is provided with set screw and key, as shown. The jaws A A are malleable iron, and the limb work D D of forged steel. Every precaution in the way of split cotters and lock nuts is taken to guard against accident.

The Covert Auto Jack.

The Covert Manufacturing Company, West Troy, N. Y., are putting on the market the screw jack shown herewith. It is made in two sizes, No. 501 being intended

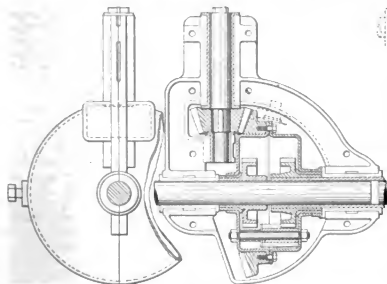


for use on motor vehicles. It weighs 7 pounds and will lift 3,000 pounds, and adjusts in height from 11 to 17 inches. No. 503 is more powerful, and is intended for heavy vehicles and trucks. It weighs 12 pounds and will lift 5,000 pounds, adjust-

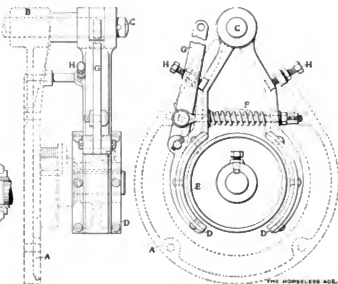
ing in height from 14½ to 23½ inches. This is a ratchet double screw lifting jack, the threads being right and left handed respectively on the upper and lower portions. The sleeve to which the lever is attached is free to move around the screw stem, while the toothed wheel below is securely fixed to the screw stem. The lever has a projection, or dog, from its inner end which engages between the teeth of the wheel below. In operation the lever is lowered to throw the projection in engagement with the teeth of the wheel, and by shifting the lever in a horizontal direction the screw will be made to separate or draw together the upper and lower portions of the jack, to raise or lower the object desired. Detachable sections may be obtained which may be readily slipped on or taken off the upper portion of the jack, to give it the desired height to accommodate various conditions. The point is made that there are no loose parts and that the jack takes up little space in a vehicle. When it is necessary to use the jack in a corner or other contracted space the ratchet on the Covert jack permits the free use of the lever.

A "motoring school" has been founded in London by Evart-Hall, Limited, Longacre, for teaching the whole art of automobilism. After the completion of the course the pupils will be examined, and if found sufficiently expert are to be granted certificates in three grades—provisional, expert and honors.

One of the drivers in the English Reliability Trials was a young lady from Paris, a professional chauffeuse. According to an observer on her car she did not understand a word of English, consequently had never read the rules of the contest, and seemed to be under the impression that it was a race. Also, she constantly tried to keep the right hand side of the road (French and American rule of the road), and for this and other reasons had troubles galore.



BEVEL GEAR DRIVE.



JAW BRAKE.



NEW HERSCHMANN TRUCK.

New Herschmann Truck.

We show herewith several photos of a new steam truck built under the patents of Arthur J. Herschmann for the Manhattan Delivery Company. The nominal capacity of this truck is 2 tons, although it is said to be capable of carrying as much as 3 tons under favorable conditions. The engine develops 15 horse power and the boiler is of the regular fire tube type, with 70 square feet of heating surface. All parts of the mechanism are enclosed, and the vehicle bears considerable resemblance to an electric truck. Mr. Herschmann states

that the truck is built for all year round service, and has suggested to the Automobile Club of America that a business vehicle contest be held during the coming winter on the same lines as the contest which the club organized last spring.

The Fall Tour of the Automobile Club of America.

Never has a more delightful tour been made than the one completed last week by the Automobile Club of America. Over 550 miles of road, good, bad and indifferent, were covered, through some of the most picturesque and beautiful country in the East.

The route as laid out was to Boston by way of New Haven and Hartford, and return through Springfield, Pittsfield and Poughkeepsie. There were several reasons for selecting this route—first, it offers more miles of good road than could otherwise be found in a like distance; second, it provides better hotel and station facilities than usual, and, third, it goes through a beautiful section of New England.

Many who went along on this club run had toured before over the whole or parts of the route, but it is safe to say that no one has ever taken it under more delightful conditions. The weather was perfect. Except for the ever present dust the roads were in touring shape. The party was congenial, and the fellowship of others made the run pleasant for all.

Then, too, aside from an oc-

casional good natured brush on the road, there was nothing in the nature of a contest in the trip. No restrictions, no observers, no rules or regulations. Nothing for anyone but to do as they pleased. Each member started early or late as suited him, and stopped where or when he pleased.

The run started on Friday morning, September 25, from the clubhouse at the Plaza. Frank Eveland in an autocar left at 6 o'clock, and Col. John Jacob Astor in his Mercedes did not get away until 11 o'clock. In between these two were nineteen other starters, who left in the following order: H. W. Whipple (Mors), C. H. Gillette (Toledo), E. Weston (Mors), Emerson Brooks (Cadillac), Paul Deming (White), A. R. Shattuck (Panhard), Elmer Apperson (Apperson), Geo. F. Chamberlain (White), J. V. Black (Winton), Jefferson Seligman (Rochet-Schneider), Dr. Lewis Morris (Fiat), M. M. Belding, Jr. (Peerless), Jas. L. Breese (Mercedes), Rob't L. Morrell (Locomotive), F. G. Webb (Winton), S. K. Lichtenstein (Franklin), R. M. Owen (Franklin), Kenneth A. Skinner (De Dion), C. T. Adams (Oldsmobile).

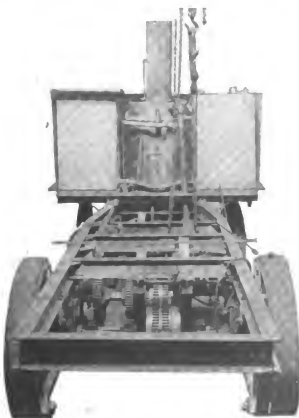
Of these twenty-one starters five returned to New York for various reasons before reaching Hartford. The five who dropped out were as follows: Jefferson Seligman, M. M. Belding, S. K. Lichtenstein, R. M. Owen and C. T. Adams. The remaining sixteen went through to Boston, where Colonel Astor went to Newport, Frank Eveland returned direct to New York, and K. A. Skinner dropped out after making a double century to Springfield and back on Monday. Colgate Hoyt in his Mercedes joined the club here, and later on E. Weston dropped out, leaving thirteen to return to New York on the scheduled time.

Inasmuch as there was no competition as regards getting in first at night, the order of arrival at the various points matters but little. The high powered French and German cars naturally made somewhat better time and in most cases got in a little ahead of the smaller American machines. The two small cars in the run, a 12 horse power Toledo and a 6½ horse power Cadillac, driven by Mr. Gillette and Mr. Brooks respectively, were both in on time every night, with the exception of Wednesday night at Newburgh, where Mr. Gillette did not arrive until the next morning owing to a broken spring.

It may be remarked here that the record of delays is interestingly small in view of the length of the journey and some of the roads which the cars were required to go over. There were no serious breakdowns and but few of the smaller annoyances such as tire and sparking troubles.

There also was a gratifying absence of accidents. A few chickens were run over and one or two dogs. One member held the record in this sort of trouble, having run over three chickens, two guinea fowl (both at the same time) and one dog.

As far as known, there were no accidents from runaways or frightened horses. al-



CHASSIS OF THE HERSCHMANN TRUCK.

though the continuous procession of big machines must have been trying to both horses and drivers. One timid mannered clerical looking gentleman stopped his horse and stood by his head nearly a quarter of a mile in front of one car and signalled frantically for the car to stop. The owner slowed down and went by as quietly as possible, while the old horse, not deigning to look at the machine, nibbled the bushes at the side of the road. As the car went slowly by a woman's head appeared from behind a tree trunk, and seeing the danger to be over for the present, came cautiously from her point of safety and climbed timidly back into the buggy. At least a dozen cars had been past them, and it was the performance each time they must have been having a lovely drive.

Another incident in which this same car figured occurred on a lonely mountain road near Pittsfield. Two women and a very small boy were driving a city broken horse of some spirit, but thoroughly used to automobiles. It doubtless was startling to see a big automobile looming up on a narrow road and both women became thoroughly frightened. The car was stopped and the younger woman who was driving turned up on the bank and frantically told the other to jump with the boy. The horse meantime was behaving splendidly, considering that he was headed for a stone wall, and came to a standstill. The older woman was unable to get out, and taking the boy by the arm evidently attempted to throw him out. In any event, he held him dangling in the air for a few seconds, and finally dropped him directly under the rear wheel. Fortunately, the horse stood quietly, and with one of the party from the car at his head the small boy crawled in safety from underneath, crying at the top of his voice. After calming down the women apologized for the scene and admitted that they were much more to blame than either the horse or the automobile.

But to return to the route. The first day's run was to Hartford, 121 miles, over generally good roads. Between New Haven and Hartford there is a stretch of bad sand road, but aside from this short piece and a few hills in the vicinity of Greenwich, everything was as perfect as the tourist could desire. The weather was perfect and the run along the Sound delightful. The road comes only occasionally in sight of the water, just often enough to break the monotony of country and towns. The towns and cities in Connecticut are fairly close together, almost too close for pleasant touring, were it not for the fact that nearly all of them are interesting and beautiful. The route runs through the main street of nearly all of the towns, and in almost every case this is one of those beautiful, tree lined New England main streets, with beautiful old mansions with broad lawns in front and only a small business settlement in the heart of the town.

From Hartford the second day's run was



THE PLAZA, WHERE THE START WAS MADE.

to Boston, 124 miles, and most of it over macadam roads. The road as far as Springfield follows the Connecticut River through Windsor and Longmeadow, and, although dirt, for most of the way is in excellent condition. For several miles beyond Springfield there is one of Massachusetts' fine State roads, but later on the route runs into the bad hills and sandy roads in the vicinity of Palmer. All the way from Springfield to Worcester there are occasional patches of State road—just enough to relieve the weariness of the horrible sand. It is a question as to whether these short tastes of paradise are not more ag-

gravating than comforting. It certainly is a comfort to run onto a piece of smooth macadam after several miles of sand and ruts, but it is just as certainly annoying, after having drifted smoothly along for a mile or two, to drop suddenly into a slough of despond. The shock of striking stones and ruts and plowing through deep, loose sand is relieved only by the thought of better roads ahead.

Spencer and Leicester hills are always dreaded, but they pale into insignificance in comparison with some that were met with in the Berkshires. The roads on these hills are good macadam, and they need not



BEAUTIFUL STRETCH OF MASSACHUSETTS STATE ROAD.



A STOP FOR LUNCH.

be dreaded by any car that has ever been near Pittsfield.

From Worcester into Boston is State road all the way, and very grateful it is to know that the end of a long day's run is over good smooth roads. From Natick the road is like a parkway—in fact, a good part of it actually is boulevard or public park drive.

On Monday the route was retraced to Springfield, and from there on Tuesday was through Westfield, Huntington, East Lee and Lenox to Pittsfield—a short run of less than 60 miles, but, as far as poor roads and hills are concerned, the hardest

of the trip. The first and last of this run is macadam, but in between are sand and stones and hills of the heaviest grade possible to negotiate. In fact, there was more than one car obliged to heed the small boy's universal advice and "get a horse."

The scenery on this run more than compensates for the inconveniences of the road. The Berkshires are always beautiful, but never more so than in the fall. The rugged hills and mountains and the beautiful rivers and valleys are well worth the trouble of grades and sand.

From Pittsfield to Newburgh, the last night's stop, was in many respects the best

day of the trip. The "Under Mountain road" from Great Barrington to Lakeville was perfect for a dirt road, hard and firm and no hills to speak of. From Lakeville to Poughkeepsie is a trifle hillier, but the road is good all the way. The route is through Sharon, Amenia and Millbrook to Poughkeepsie, and from there along the east bank of the river to the ferry at Fishkill Landing to Newburgh.

The run from Newburgh to New York is through Tuxedo and Suffern to Hackensack, and from there to Fort Lee or Weehawken ferries. This entire run is over generally good roads, much of it macadam, and around Tuxedo the views are almost as beautiful as in the Berkshires.

No story of the trip would be complete without mention of the entertainments at the night stops. At Hartford there was a dinner at the Allyn House, and a most enjoyable affair it was, too. At Boston the Automobile Club gave a luncheon to the visiting tourists on Sunday noon, and then escorted them on a little (?) run of 54 miles to the historic Wayside Inn at Sudbury. Sunday evening there was a club dinner at Young's Hotel.

At Pittsfield there was a dinner at the Wendell, one of the most enjoyable of the trip. Thursday noon Harlan W. Whipple invited all the members and their guests to lunch at Nyack, which was one of the most enjoyable events of the entire trip.

When New York was reached there were some tired members, but everyone agreed that it had been the pleasantest of all their automobilizing experiences. There was not one but that said he had enjoyed every minute of it, and was looking forward to next year's fall tour.

The whole undertaking was a complete success, largely owing to the careful arrangements which Mr. Butler had made in advance. The only thing to be regretted is that more did not enter. So long a club run was more or less of an experiment, and its success will doubtless bring forth a larger number of participants next year.

N. A. A. M.

The Ford Motor Company, Detroit, Mich., has been admitted to membership.

A late entry in the Endurance Run was the St. Louis Motor Carriage Company, St. Louis, Mo.

At a meeting held on October 5 the N. A. A. M. appropriated \$5,000 toward the fitting up of spaces at the St. Louis Fair next year, this sum to be supplemented by further appropriations as may be needed. Fifty-seven applications for space have been made with a total of 81,000 square feet, of which 55,000 square feet have been granted.

At the last meeting of the Central German Automobile Club it was proposed to organize for next year an international automobile race on the 3 mile Boxberg track near Gotha.



HILLS AND VALLEYS ALONG THE ROUTE.

The Empire City Track Races.

The races on the Empire City track at Yonkers last Saturday afternoon were very successful in some respects while lacking in others. Records tumbled in bunches and the meet was fortunately devoid of accidents, but the proportion of starters to entries was small, the intervals between some of the events were rather long, and the attendance was considerably smaller than at the last meet on this track. At no time during the afternoon was the grand stand more than half filled, though many occupied positions on the lawn and along the fences, and the clubhouse verandas were crowded. The total admission is said to have been 5,000. While the total attendance was not so great, society was more in evidence than at the summer meet, which is, of course, readily accounted for by the change in seasons. There were no less than 335 cars ranged along the lawn and back of the grand stand, nearly all of the touring car variety and nearly one-half of them of foreign make. The large preponderance of touring cars is characteristic. The weather was magnificent.

The honors of the day fell to Barney Oldfield and Henri Paige, though Joseph Tracy also made a very creditable record on a light machine. Of the seven events on the program one was not run, and of the other six two were won by Paige (Deauville) and one each was won by Oldfield (Winton), Tracy (Richard-Brasier), Plank (Cadillac) and McNeil (Locomotive). New track records were established during the day for all distances from 5 to 15 miles (Oldfield), for machines under 1,800 pounds for 10 miles (Paige), and for machines under 1,200 pounds for 5 miles (Tracy). The track was in fair condition, though the rain the night before was said



TEN MILE RACE FOR CARS UNDER 1,800 POUNDS.

to have made it rather heavy at some points.

The races were started promptly at 2 o'clock, and the special 5 mile race for 16 horse power Locomobile gasoline cars was run off first. There were four starters, as follows: Walter T. Wallace, Glen Ridge, N. J.; M. M. Riglander, of New York; De Ver H. Warner, Bridgeport, Conn., and Archibald McNeil, Bridgeport. Wallace took the lead at the start, but was passed by Riglander at the quarter mile pole. At the end of the first mile McNeil had gotten the lead, which he retained and gradually increased, winning by a safe distance, in 7:19 2-5. Warner took second place and Riglander third, the former being about a yard ahead of the latter when crossing the finish line. The prize in this event was a silver trophy donated by the Locomobile Company.

In the 5 mile race for cars under 1,200

pounds, for a \$100 and a \$50 silver trophy, there were three starters: F. A. La Roche, 12 horse power La Roche; Joseph Tracy, 24 horse power Georges Richard-Brasier, and I. D. Plank, 6½ horse power Cadillac. Tracy led from the first and broke all records for this class up to the 5 miles. The times for the different miles were as follows: 1:19.3-5, 2:24.1-5, 3:47.3-5, 5:12.4-5 and 6:16 3-5. The former 5 miles record for this class—6:54 3-5—was established on this track by John Wilkinson on July 25 last.

As was perhaps to be expected on account of its greatly superior horse power, Tracy's machine was very much faster than the two others, and he won from La Roche by 1½ miles. The radiator on this machine was provided with a sort of chimney, from which steam issued as though the car was a steamer. Later in the day, when lining up for another event, some essential



BARNEY OLDFIELD PASSING GRAND STAND IN FIFTEEN MILE RACE.



LINING UP FOR THE RACE RESERVED TO SIXTEEN HORSE POWER LOCOMOBILES.

part of this machine broke, so it had to be towed off the track.

The next event, a 10 mile race limited to cars under 1,800 pounds, for silver trophies valued at \$100 and \$50 respectively, proved to be one of the most interesting of the day. There were four starters, as follows: Henri Paige (Decauville), Harry Cunningham (Packard Gray Wolf), F. A. La Roche (40 horse power Darracq) and J. Peyer (24 horse power Renault). Paige gained a considerable lead at the start and improved it steadily, lapping Cunningham during the ninth mile and winning by $1\frac{1}{4}$ miles. La Roche was about the same distance behind Cunningham. The Renault machine for some reason did not show any speed and retired early in the race. Paige's time for the 10 miles was 10:16 2-5, which clipped 36 2-5 seconds off the previous world's record. The fastest mile was done in 59 4-5 seconds. When it was announced through the megaphone that records were being broken there was some cheering from the grand stand when Paige next passed, as well as tooting of horns. Cunningham's time for the 10 miles was 11:34 3-5.

Owing to a broken valve La Roche was

unable to start in the special match race, which was run off next, and only two machines lined up, the Decauville, driven by Paige, and the Packard, driven by Chas. Schmidt. There was some contention about the distance to be run, the race being announced a 10 mile in the catalogue, but the start being given with the understanding that only 5 miles were to be run. The racers were then called back and started for a 10 mile race as originally planned. Paige again went ahead of the Packard machine and won in 10:23. The first and sixth miles were made in record time. Schmidt's time was 11:08 1-5.

The next race, the 15 miles free for all for two silver trophies, was the event of the day. The following five started: Laurent Grosso, 60 horse power Mercedes; Henri Paige, 40 horse power Decauville; Harry Cunningham, 25 horse power Packard; J. Peyer, 24 horse power Renault, and Barney Oldfield, 80 horse power Winton. Oldfield had the fence at the start, but with great determination cut right in and took the pole at the turn. Paige gave him a lively chase, but Oldfield gradually increased his lead. The Renault dropped

out early. At the end of the first mile the order was: Oldfield, Paige, Grosso, Cunningham, and this order was maintained throughout, except that the Mercedes dropped out after the fifth mile. At the end of the fifth mile a new track record was announced, and again after every succeeding mile. Oldfield lapped Cunningham just before the end of the eighth mile. His time for the 15 miles was 14:35; previous world's record, 16:10 4-5. Paige finished second, in 15:7 1-5.

The next event was the Empire handicap, which was announced as the first of its kind in the world. The novelty was painfully apparent in the tediousness in effecting a satisfactory start, and before this event was over the grand stand was as bare as a forest tree in December. The starters were ranged around the track according to their handicaps, and were to be started by a pistol shot at the starting line and by waving a flag on the observation tower. This rather crude method naturally proved unsatisfactory. The starters in this event and their handicaps were as follows: Laurent Grosso, 60 horse power Mercedes, scratch; Henri Paige, Decau-



GRAY WOLF PURSUED BY DECAUVILLE IN SPECIAL MATCH RACE.



JOSEPH TRACY ON TWENTY-FOUR HORSE POWER GEORGES RICHARD-BRASIER.

ville, $\frac{3}{4}$ mile; Charles Schmidt, Packard, 3:16 mile; L. P. Smith, 24 horse power Columbia, 1:1-16 miles, and I. D. Plank, $6\frac{1}{2}$ horse power Cadillac, $2\frac{1}{4}$ miles. Plank made his $2\frac{1}{4}$ miles in 4:43 1-5, considerably inside the world's record for 5 miles, and won. Paige finished second, and Charles Schmidt third.

A number of the machines then made one mile record trials. The Packard Gray Wolf made a time of 1:03; the Renault, 1:24 2-5, and the Decauville, 1:01.

Earlier in the afternoon Barney Oldfield made two successive, but unsuccessful attempts to lower his own record for the mile.

SUMMARY.

Special race for 16 horse power Locomobiles—Archie McNeil, winner. Time, 7:10 2-5.

Five miles for cars under 1,200 pounds—Joseph Tracy (Georges Richard-Brasier), winner. Time, 6:16 3-5 (record).

Ten miles for cars under 1,800 pounds—

of those eager for a ride, substitutions were easily made. The number of official starters was 104.

The long procession moved sedately and without mishaps or stoppages through Bromley and Beckenham, and the inhabitants soon singled out the two lady drivers and cheered them heartily. One of them, a French lady, was driving a 6 horse power Relyante, and the other, Miss Dorothy Leviatt, was steering her own 12 horse power Gladiator.

Not until Chislehurst was reached did any mishap occur, and here a very nasty hill, on which workmen were busy with upheavals, was the cause of two breakdowns, and might have been the cause of more, for several cars were bunched together in the ascent.

The Ariel 12 horse power car, in attempting to avoid a collision with a car which threatened to "run back," bent the axle so badly that it could not resume the journey, and a Rex tri-car of $3\frac{1}{2}$ horse power ex-

cluding the $6\frac{1}{2}$ horse power Cadillac, the 10 horse power White steam touring car and the 20 horse power Winton.

TO EASTBOURNE AND BACK.

On Saturday the run was from the Crystal Palace to Eastbourne and back, 121 miles. The starters this day numbered on'y ninety-three, showing eleven to have dropped out. Although the weather was fine, the dust, particularly on Hayes Common and by Wilmington Woods, was abundant, searching and irritating. The rain that had fallen overnight had no effect whatever in keeping it in its proper place as a soft, easy carpet for running, while the stiff breeze that sometimes blew across the track helped it to be more pernicious even than usual.

As no cleaning is allowed during the progress of the trials, the cars now looked more dusty than when they started on the first run, but as they sped on their way through Shortlands and Bromley to Farnborough it was easy to see that the dust



MR. COZENS HARBY STARTING THE CARS AT CRYSTAL PALACE.



ON WROTHAM HILL.

Henri Paige (Decauville), winner. Time, 10:16 2-5 (record).

Special ten mile match race—Henri Paige, winner. Time, 10:23.

Fifteen miles, free for all race—Barney Oldfield (Winton), winner. Time, 14:35 (record).

Five miles, handicap, free for all—I. D. Plank (Cadillac), winner; handicap, $2\frac{1}{4}$ miles. Time, 4:43 1-5.

The British Reliability Trials

TO MARGATE AND BACK.

The first of the series of runs constituting the British Reliability Trials took place on Friday, September 18, from the Crystal Palace grounds to Margate and back, 150 $\frac{1}{4}$ miles, in magnificent weather. The start was made at 7:30, the cars being dispatched at thirty seconds intervals, S. F. Edge acting as marshal. The proceedings at the start worked with great smoothness, although in some instances some members of the "full complement of passengers" failed to appear, but as there were plenty

perceived a clutch accident at the same spot, which also put it out of action. A Wilson & Pilcher 12 horse power abandoned the run at Wrotham owing to a nut getting adrift, and a 20 horse power Holcar was forced to return to the Palace owing to trouble with the gear.

From Wrotham to Maidstone the course was uneventful. At Maidstone there was a fifteen minutes' stop for refreshments, and then off again through Faversham and Canterbury to Margate. When nearing Margate some of the competitors were warned by two motor bicyclists of a police trap, and some twenty cars bunched together and virtually crawled past the alleged dangerous spot. However, no trace of a trap was seen.

The return journey was equally uneventful. At Margate there was a stop of three-quarters of an hour for lunch, and by 8 o'clock the majority of the cars had returned to the Palace.

The results for this day, as given out on the 19th, show that thirty-five cars completed the run without penalized stops, in-

and grime were not interfering very much with their speed or smoothness of running. The first breakdown was at Locksbottom, about a mile from Farnborough, where a 6 horse power Elswick car had some ignition troubles and returned to the Palace. The only accident approaching seriousness during the day was at the foot of River Hill, that long, winding and rough descent, where a $6\frac{1}{2}$ horse power Cadillac broke a wheel in a collision. Eight miles beyond Tunbridge Wells a 12 horse power Humber retired for the day through a gear wheel stripping, and on the return journey a 12 horse power Chenard & Walcker withdrew from the run at Westerham Hill. At River Hill part of the road was treated with westrumite, which most effectually laid the dust.

There was a compulsory stop of fifteen minutes at Tunbridge Wells. Although the entire distance to be traversed was about 30 miles shorter than on Friday the route was much more difficult. There were more steep hills, some of them, such as River Hill, being extremely dangerous,

with sharp twists, curves, corners and blind crossroads. On the other hand, there were fewer controls.

From Tunbridge Wells the route was through Frant and Mayfield. At the latter place the police had established electric communication between two points, an eighth of a mile apart, on a lonely bit of road. At one end of the wire two policemen sitting on buckets awaited the signal of another policeman at the opposite end of the wire. When the first car had been held up, however, there were no more captures, as the driver warned the next arrival, who in his turn passed the word along.

Of the ninety-three starters, twenty-three made non-stop runs and fifty had delays amounting to less than five minutes. The White steam car was among the twenty-three which made perfect records.

TO WORTHING AND BACK.

On Monday the weather was fine and eighty-nine cars started on the day's run of 118½ miles. Compulsory stops of fifteen

cluding eleven in Class A (runabouts). The Cadillac had its broken wheel replaced and participated again in the run. Thirty-nine cars made non-stop runs and thirty-two had only very short stops.

The Winton car, which had run well so far and on the first day made a non-stop run, broke the crank shaft on this run, which prevented it from finishing in control time. A new shaft was immediately procured from London, and the car was in condition again the next morning and went successfully through the next day's run, but it is said that the accident will entail disqualification.

TO SOUTHESEA AND BACK.

On Wednesday's run a number of police traps were encountered again. The competitors were warned, however, and few, if any, were detained, but a good portion of the outward journey was made at a crawling pace. During this day's run the test of appearance and cleanliness was held, as well as a brake test, the place for both of

pletion of the outward journey. 61 miles, the speed trials were run off over a measured half mile stretch. Following are the cars which made the best speeds in the various classes and their speed in miles per hour: Century tandem, 31.8 miles; 6½ horse power Clyde, 33; 8 horse power M. M. C., 29½; 12 horse power Wolseley, 35; 12 horse power Gladiator, 41.3; 10 horse power Gardner Serpollet, 42.8; 20 horse power M. M. C., 44.6; 24 horse power De Dietrich, 42.4. It should be mentioned that these speeds were made with a full complement of passengers and full equipment. By 8 o'clock seventy-five competitors—all but two—had arrived at the Palace, forty-six having made non-stop runs. It will be noticed that as the trials proceed the cars dropping out grow smaller and smaller in number, showing that the weak ones (from a reliability standpoint) had been fairly well eliminated. The revised figures for this day's run show that only one dropped out, forty-six made non-stop runs, eleven were



AN OBSERVER'S CAR.



TWENTY HORSE POWER HUMBER.

minutes were made at Dorking on the outward and Horsham on the return journey. with a luncheon interval of three-quarters of an hour at Worthing. A stiff, hill climbing contest took place on Bury Hill, near Arundel, which has an average gradient of 9 per cent., the majority of the cars giving very satisfactory results.

Police traps were found rather frequently in the course of the day, the wily constable being discovered disguised as a cyclist, as an artisan and as a rustic sitting on a gate. Thanks to warnings given by motor cyclists, bicyclists and the public, their capture was not large, but it adds an irritating element to the worries of the drivers, who are under surveillance all the time by the observers.

At the close of the day it was found that no fewer than thirty-four cars made non-stop records and forty-two had delays of a few minutes.

TO FOLKESTONE AND BACK.

Tuesday was the first rainy day of the contest. Eighty-four vehicles started, in-

these tests having been kept secret. During the return trip near Milford the cars were lined up along the side of the road and inspected by the judges, which occupied several hours. The brake test was conducted in the manner that two officials with red flags concealed at the sides of the road as each car passed suddenly sprang out into the road, waving their flags as a signal for the driver to stop. In some cases, we understand, the signal was misunderstood, as the police sometimes also use red flags in trapping cars. Among the mishaps of the day was that to a 20 horse power Richard, which ran into a fence and up a bank in trying to avoid running into a cyclist, it is said. The start and finish of this day's run both took place in a fog. Of eighty starters thirty-six had returned to the Crystal Palace by 8 o'clock, eighteen of these having made non-stop runs.

TO BEXHILL AND BACK.

On Thursday, September 24, the cars made a run to Bexhill and back, there being seventy-seven starters. After the com-

penalized less than five marks each for stops, and eighteen had stops exceeding five minutes each.

TO WINCHESTER AND BACK.

On Friday morning seventy-six cars started for the run to Winchester and back, 133½ miles. Of these forty-four made non-stop runs and twenty-seven had only short delays, not exceeding five minutes for each.

An English Estimate Versus an American Statement.

An English contemporary states that the estimated production of autos in the United States this year is 30,000 and that the demand is not half satisfied. An American goes one better, stating that all the leading manufacturers have sold their capacity three times over. We have never personally met any of the 30,000 or 60,000 gentlemen who though ready to buy were unable to get machines, but they have our sympathy all the same.



E. G. Skinner, of Chicago, will open an auto station at Sterling, Ill.

The automobile owners of Marinette, Wis., are talking of organizing a club.

The F. B. Stearns Company, Cleveland, Ohio, has joined the Licensed Association.

Seeds & Evans have taken the agency for the Ford cars in Columbus, Ohio, and surrounding counties.

The Motor Castings Company, 101 Gray's Inn road, London W. C., desire catalogues, price lists and dealers' discounts from American manufacturers.

L. L. Whitman and E. L. Hammond, the transcontinental tourists, continued from New York in their Oldsmobile and reached Portland, Me., on September 23.

E. T. Birdsall has been elected vice president and general manager of the Standard Automobile Company, 136 West Thirty-eighth street, New York, succeeding J. R. Chisholm.

C. L. Bockus, formerly superintendent of the Mohawk Cycle Company, Indianapolis, has resigned to accept a similar position with the Columbus Motor Vehicle Company, Columbus, Ohio.

Bert Holcomb, who recently drove a Columbus gasoline car from Chicago to New York in record time, will undertake to lower his record with the same machine, as several hours were lost in consequence of fog and lack of familiarity with the road.

United States exports of automobiles and parts during the month of August last amounted to \$171,132, and during the eight months ending with August, 1903, to \$1,049,311. The corresponding figures for last year are \$71,907 and \$786,137.

A new feature in the automobile business will be an auction sale of new and second hand machines by W. D. Grand at the Grand Central Palace, Lexington avenue, Forty-third to Forty-fourth streets, on Thursday and Friday, October 22 and 23. Entries for the sale close on Saturday next, October 10.

On September 30 J. D. Case, Rushville, Ind., took rural mail carrier Louis J. Kline over his route in his Elmore car, as an experiment in auto free delivery. The route is 24½ miles long, over the best roads in the county, through a very thickly settled region, and the service is to 104 boxes. The trip was made in an hour and fifty minutes, 99 stops being made and 439 pieces of mail delivered.

The business of the Jones-Corbin Company, Philadelphia, Pa., which recently went into bankruptcy, has been placed in the hands of a trustee who will shortly sell the assets at auction. The total assets are estimated at about \$100,000, while the liabilities are between \$60,000 and \$70,000. Some of the larger claims, it is contended, are un-

just, and an effort will be made to have them thrown out. A meeting of creditors will be held on October 17.

The Tennant Auto Tire Company, Springfield, Ohio, are reported about to erect a plant there.

The Morlock Automobile Company, Buffalo, N. Y., have closed down pending an increase of capital.

Owing to ill health A. C. Bostwick has resigned from the board of governors of the Automobile Club of America.

Charles A. Molloy has been appointed receiver of the Westchester Automobile Company, 523 Fifth avenue, New York.

The American Ball Bearing Company, Cleveland, Ohio, are moving into a new factory specially constructed for their business.

Fred F. Dudley, has bought out the business known as the Columbus Automobile Exchange, 147 to 153 Columbus avenue, Boston, Mass.

The Burns Typewriter Company, Buffalo, N. Y., have built and tested a gasoline machine, but have decided not to manufacture for the present.

It is reported that the Buffalo Electric Vehicle Company may put out a gasoline vehicle next year, manufactured for them by the Schaeffer-Bromley Company, Lockport, N. Y.

The Banker Brothers Company, Philadelphia, Pa., reports the following recent sales: John H. Converse, Rosemont, Pa., and Ewing L. Miller and J. I. Nichols, Philadelphia.

The Knox Automobile Company has just completed a 100x50 feet four story building, which will be used as an addition to their body department, particularly for ironing, painting and trimming.

The New England Insurance Exchange at a recent meeting has amended the rate on automobiles, making it 75 cents for those using steam power and 50 cents for those using explosive engine power.

C. S. Henshaw, Boston, Mass., reports the following sales of Thomas touring cars: F. F. Wentworth, Dover, N. H.; G. L. Gott, Newtonville, Mass.; E. A. Danforth, Natick, Mass., and J. F. Doodey, Dorchester, Mass.

At the coroner's inquest over the death of J. Francis Shearer, who was killed by Barney Oldfield's automobile at the Detroit races recently, Oldfield testified that the tires on his machine were in proper condition before the accident. A verdict of accidental death was rendered.

The North Jersey Motor Car Company has succeeded to the business of J. M. Schmidt, Brick Church, East Orange, N. J., and Mr. Schmidt has opened an agency nearby for the White steam touring cars and the Waverley electric vehicles.

Automobilists using the Philadelphia ferries of the Pennsylvania Railroad complain that the officials there are not so lenient as they are at the North River ferries of the same road which ply to New York. An appeal will be made to the

Bureau of Steam Navigation at Washington.

The Searchmont Automobile Company are testing out their new four cylinder model.

Geo. B. Adams has secured the New York agency for Apperson Brothers, Kokomo, Ind.

G. L. Henry has bought out the business of the American Touring Car Company, New York city.

Ayres & Henry, Sydney, Australia, have contracted for 200 Oldsmobiles for the Australasian market.

Byron V. Covert & Co., Lockport, N. Y., were unable to complete their 1904 model in time to take part in the Endurance Run.

The American Vencer Company, Jersey City, N. J., will move November 1 to New Orange, N. J., in order to increase facilities.

The Buckmole Company, Utica, N. Y., have an order for fifty machines from the Los Angeles Automobile Company, Los Angeles, Cal.

J. C. Stevens, Jr., has been elected trustee of the bankrupt National Automobile and Motor Company, Milwaukee, Wis., and will sell the assets at auction October 12.

E. A. Williams & Son, Jersey City, N. J., are putting on the market a new alloy of aluminum called alumenoid, for gear cases, which is claimed to possess twice the strength of aluminum and has only half the weight of brass.

The Cleveland Car Specialty Company, Cleveland, Ohio, are preparing to place on the market a full line of pressed steel automobile frames, made from cold rolled or hot rolled steel, to manufacturers' specifications. The selling department is in charge of George L. Weiss, well and favorably known to the automobile trade.

The American Tubular Wheel Company, Pittsburg, Pa., has formed a consolidation with the Parish & Bingham Company, Cleveland, Ohio, and will at once move its plant to Cleveland. The product of the wheel company will hereafter be manufactured by the latter company with increased facilities, the latest design being a tubular wheel of the artillery pattern invented by T. W. Plumb and G. W. Morse. Both Mr. Plumb and Mr. Foster will be identified with the Parish & Bingham Company, the former having charge of the sales department.

A Thornycroft steam wagon recently came to the assistance of a heavy steam roller in Durham. Owing to heavy rains in the district between Middleton and Langdon Beck, the road was under repair, a heavy steam roller rolling in new metal. On a particularly soft piece of road the roller stuck and sunk over a foot into the ground, when by good fortune the Thornycroft steamer hove in sight, was promptly hitched by means of ropes and chains to its ungainly sister machine, and without any difficulty steamed away, hauling the roller after it.

LEGISLATIVE AND LEGAL.

The Kansas City Automobile Club has applied for a charter of incorporation.

The license inspectors of Kansas City, Mo., have started a campaign to compel automobile owners to take out licenses according to the law.

The board of review, Cleveland, Ohio, has notified 250 of the automobile owners of that city who have failed to return their automobiles in the tax lists that if no answer is received the automobiles will be assessed at \$1,000 each.

Fred Densmore, Louis Farrar and several other auto owners of Erie, Pa., who refused to take out licenses under the new registration law and were summoned, have declared their intention to carry the cases to the Supreme Court if necessary.

Members of the St. Louis Automobile Club are forming an association to be known as the Automobile Club of St. Louis Legal Defense Association. The purpose of this association will be to adjust claims and defend suits against its members on account of alleged damages caused by them to persons or property in the use of automobiles.

New Incorporations.

Curtis Auto Motor Company, Chicago, Ill.—To build automobile houses.

Young's Automobile Company, Pierre, S. Dak.—Capital stock, \$1,000,000.

Pardee & Co., Chicago, Ill.—Capital, \$20,000. Incorporators, F. D. Pardee, W. L. de Lafontaine, J. B. Hess.

Auburn Automobile Company, Auburn, Ind.—Capital stock, \$75,000. Incorporators, Charles, Frank and Morris Eckhart.

Sterling Motor Company, Binghamton, N. Y.—Capital, \$25,000. Incorporators, O. S. Heller, F. H. Matthews and H. W. Edson.

Burlington Automobile Stage Company, Burlington, N. J.—Organizers, Patrick Kearns, Charles P. Farnes, Ernest Watts and others.

Grand Rapids Automobile Company, Grand Rapids, Mich.—Capital stock, \$25,000. Incorporators, William Vandecar, Charles H. Bull and Joseph C. McKee.

The Oscar Lear Automobile Company, of Columbus, Ohio, September 14.—Capital, \$30,000. Incorporators, Oscar Lear, E. J. Miller, B. W. Gillfillan, W. Guy Jones and W. H. Halliday.

Victor Auto Storage Company, Jersey City, N. J.—Capital, \$10,000. Incorporators, R. Lindsey Coleman, James R. Kirkpatrick, Wm. M. Haradon, Victor J. Vashon and Paul Walton.

The Empire Motor Car Company, Binghamton, N. Y.—Capital, \$20,000. Incorporators, Geo. A. Kent, Arthur L. Kent,

Fred H. Matthews, Harry W. Edson, S. W. Brown and O. S. Heller.

The American De Dietrich Motor Car Company, New York city.—Capital, \$100,000. Incorporators, R. E. Jarriage, Louis Frankel and Albert LeMaitre.

The Baltimore Motor Car Company, Baltimore, Md.—Capital, \$500. Incorporators, Rudolph Lipps, Edward Lipps, Christopher Lipps, Geo. L. Deichman and Christopher R. Wattenscheidt.

Oldfield Disqualified.

Regarding protest filed by J. R. Chisholm, F. A. LaRoche and S. D. Walden, referring to the appearance of car No. 31 in event No. 6, at Empire Track, on October 3 last, A. R. Pardington, chairman of the racing board of the A. A. A., writes as follows:

"The protest of J. R. Chisholm (owner), F. A. LaRoche (owner) and S. D. Walden, representing the Packard Motor Car Company, against the appearance of car 31, owned by the Winton Motor Carriage Company, and driven by Barney Oldfield, is sustained. It appears from the admissions of Alfred Reeves, secretary of the promoter, that this entry was not declared until the date for receipt of entries had passed. The operator of the car No. 31, in correspondence with the signer, stated that he was not to compete, giving reasons of a personal character, which, at this time are not pertinent. The question of the right of this car 31 to start in this event No. 6 was unofficially raised before the start of the event, but, in the interest of the sport, and in consideration for the public, its right to start and receive the award was not officially protested until after the event. The awards and times made in this event are to be credited respectively to the second and third cars, as placed by the judges and recorded by the timers. This protest is filed and sustained in accordance with Rule No. 8 of the racing rules of the American Automobile Association, of 1903."

Trade Literature Received.

Duryea Power Company, Reading, Pa.—"Some Duryea Records;" "Why Do You Buy a Motor Vehicle?"

Standard Roller Bearing Company, Girard avenue, Philadelphia.—Catalogue of ball and roller bearings for automobiles, etc.

The Induction Coil Company, 9, 10 and 11 Miller Building, Milwaukee, Wis.—"The Spark That Counts—Jump Spark as Produced by the Improved Mueller Coil."

"At the important horse and foal fair at Holbeach, England, recently, the trade in nag horses was very slow. Inquiries as to the cause showed that the extensive use of the motor car by well to do people who formerly purchased nags was responsible."—Daily Mail.

Club Notes.

A. C. OF CALIFORNIA.

The Automobile Club of California has decided to hold a race meet in San Francisco some time this winter, probably in November.

BUFFALO A. C.

The Buffalo A. C. had a very successful club run to Niagara Falls and back on Saturday, September 19. The start was made from the City Hall at 3 p. m., Mayor Knight and other city officials occupying seats in some of the cars. Eighty-four machines were in line. The International Hotel, Niagara Falls, was reached by the first cars shortly after 4 o'clock. Supper was served at the hotel at 6 o'clock and the return started upon at 7:30. The run was free of accidents and a success in every respect.

The club has issued a booklet containing the constitution and bylaws, road descriptions for Buffalo's vicinity and the automobile regulations of New York State and the Province of Ontario. The membership is said to have attained nearly 300.

A. C. OF CINCINNATI.

On Saturday, September 26, the A. C. of Cincinnati enjoyed what, in that locality, was a novel club run. The novelty consisted in having an extra automobile fitted up as a buffet car accompanying the run.

The start was made from Garfield monument at half-past 1, and a run made out into the country through Walnut Hills, Hyde Park, Madisonville and Maderia. Beyond Maderia an inviting spot by the side of a brook was found, and the buffet car stopped and refreshments served to about fifty people. After a short rest the run was continued, a large portion of the eastern part of the county being traversed before the city was again reached by way of Montgomery, Silverton, Deer Park, Pleasant Ridge and Norwood. It was originally intended to make a second stop for refreshments, but at the first stop everyone showed such a keen appetite that there was not enough left to justify a second stop. The next time two buffet cars will be taken. The run was the most successful one the club has had and was thoroughly enjoyed by all.

J. Scott-Montagu, M. P., announces the formation of a "dust committee." It originated in a talk he had with the Prime Minister on the public hatred of motor cars on account of the dust nuisance, and Mr. Balfour concluded the conversation by offering £100 to start a committee to "lay the evil spirit." Toward the fund J. Scott-Montagu has contributed £50, and a similar amount has been given by The Car.

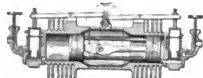
**MOTOR VEHICLE
PATENTS...**



United States Patents.

739,405. Fluid Motor.—Wm. E. Ewald, of Chicago, Ill. September 22, 1903. Filed August 27, 1900.

This is a double, opposed cylinder engine with only a single crank and connect-



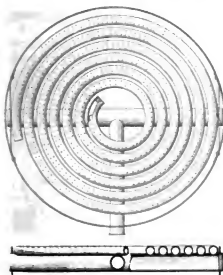
No. 739,405.

ing rod. The two pistons are rigidly connected to each other by four rods. A novel feature is a combined inlet and exhaust valve, which may be described as a combined poppet and piston valve. It is operated by a cam. The valve has three operating positions, viz., a normal or seated position, an extreme downward position and an intermediate position.

The normal or closed condition of the valve occurs during compression and explosion. After explosion and upon the return stroke of the piston the valve moves downward to its intermediate position. In this position the ducts in the wall of the valve are open and the exhaust takes place through the interior of the valve. At the next stroke of the piston the valve moves on to its extreme downward position, and at this juncture both air and oil enter the interior of the valve.

739,584. Gas Burner.—W. C. Bucknam, of Geneva, Ohio. September 22, 1903. Filed March 28, 1902.

This burner consists of a continuous spirally coiled pipe perforated on its upper



No. 739,584.

side and on its lower side intercepting a cross pipe, which conveys the gas to the coil. It is claimed that, owing to the burner pipe being all in continuous longitudinal communication, the gas pressure in all the different sections becomes equalized and the burner burns evenly throughout. This equalization of pressure has been found to be very efficient in preventing the flame snapping back into the admission tube.

739,311. Steam Engine.—Louis Hicks, Batavia, Ohio. September 22, 1903. Filed September 20, 1901.

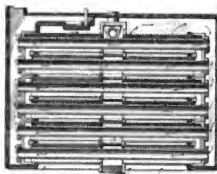
739,432. Terminal for Storage Batteries.—Jacob W. Madigan, Toronto, Canada. September 22, 1903. Filed January 10, 1903.

738,817. Change Speed Driving Mechanism.—Andrew King, of Nottingham, England. September 15, 1903. Filed February 6, 1903.

This invention relates to improvements in change speed driving mechanisms particularly applicable to motor driven road vehicles. The mechanism comprises a number of concentric friction clutches which can be thrown in and out of action in succession by the movement in one direction of an operating lever.

Two parallel shafts carry three gear wheels each, those on one shaft (from which the car is driven) being keyed thereto, and those on the other shaft being free to turn thereon. These latter three gears are fixed to concentric shafts, each provided with a clutch drum. Thus the three clutches are placed side by side and close together.

The inner portions of each clutch comprise two segmental pieces provided with leather facings and fitted to slide in a frame, which consists of side pieces firmly secured to end plates. The segments above the cam shaft have arms which project below the shaft, while the segments below the cam shaft have arms which project above the shaft, both arms carrying cam rollers. These cam rollers are held in contact with the cam shaft, or the inner portions of the clutches are held in contact with their respective clutch sleeve by compression springs, by which arrangement the clutches are positively held out of action, and the centrifugal force of the rotating segments assists in maintaining a driving contact between the two parts of the clutch. The cam shaft is made with three pairs of recesses, which are equally spaced on the shaft, each pair of recesses controlling the action of one pair of segments, so that the clutches can be thrown into action successively by turning the shaft in either direction, and when one clutch is in action the other two clutches are held out of action. The three pairs of segments can thus slide independently of each other in the frame supporting them. Consequently the three pairs of segments, the frame in which they can slide and the hollow shaft rotate as a single piece and at a speed which depends upon the particular pair of segments in gear with their driving clutch sleeve.



No. 738,311.

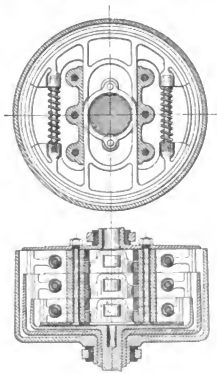
738,311. Tubular Boiler.—William T. Fox, of Rochester, N. Y. September 8, 1903. Filed April 28, 1902.

The boiler consists of a hollow casing having apertured sides, water tubes having tapered inner and outer ends, the former engaging the edge of the aperture in the casing, and hollow cap plates at the opposite ends of said tubes connecting them with a similar pair of tubes, of stay members, and adjustable devices thereon engaging the cap plates to move them relatively whereby they are secured to the tubes and the inner ends of the latter are compressed into engagement with the casing.

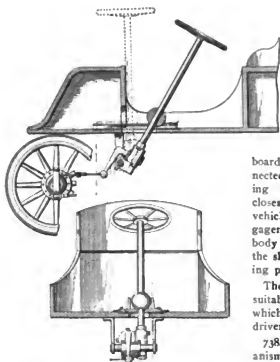
The generator is said to be light in weight, to have a large heating surface and to insure rapid circulation. The separate tubes or circulating pipes may be easily removed and replaced or new ones applied, if for any reason it is so desired.

740,210. Pump Mechanism for Automobiles.—Rollin H. White, Cleveland, Ohio. September 29, 1903. Filed January 15, 1903.

740,307. Gas or Gasoline Burner.—Martin E. Ohrnstedt, Allentown, Pa. September 29, 1903. Filed October 17, 1902.



No. 738,817.



No. 738,997.

738,997. Steering Mechanism for Motor Driven Vehicles.—Elwood Haynes, Richard Wiley and Herbert Murden, of Kokomo, Ind. September 15, 1903. Filed December 29, 1902.

The invention relates to a hand wheel steering gear which may be moved out of the way when entering and alighting from the car. The steering post at its lower end carries a worm which meshes with a worm wheel connected by links and levers to the steering knuckles. There is a deviation from common practice in the arrangement

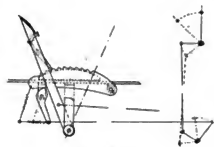
of the worm and wheel, the wheel being placed at the side of the worm instead of in front of or behind it. Worm and wheel are enclosed in a casing which is pivoted on a short shaft extending laterally below the footboard of the car, being supported by brackets secured to the footboard.

The steering post is guided by a sleeve of spherical configuration located just above the footboard of the vehicle and pivotally connected with lugs on a horizontally sliding plate, which is located over and closes an opening in the bottom of the vehicle body. The plate has sliding engagement with a plate seated in the vehicle body bottom and slotted in alignment with the slot to permit the passage of the steering post therethrough.

The steering post may be locked at any suitable angle by means of a spring latch, which may be disengaged by means of the driver's foot.

738,100. Automobile Controlling Mechanism.—Herman F. Cuntz, of Hartford, Conn. September 1, 1903. Filed June 12, 1903.

The invention provides a mechanism in an electric vehicle making it impossible to switch on the current while the brake is set. Referring to the diagram herewith, the arrangement is essentially as follows: The brake pedal operates on a notched sector, on which it can be locked in position by means of a pawl. The sector is pivoted at one end, and the other end can be moved into and out of the range of action of the pawl by means of a cam below it. This cam is provided with an arm, and by means of a system of links and levers



No. 738,100.

is connected to the controller handle. When the controller handle is moved into the on position it causes the cam to release the sector, which is then drawn out of the range of action of the brake pedal pawl, and the brake is thereby automatically released.

739,521. Roller Bearing.—Richard Treveal, Auburn, N. Y. September 22, 1903. Filed October 3, 1902.

739,658. Vehicle Wheel.—George B. Dryden, Chicago, Ill. September 22, 1903. Filed September 20, 1901.

739,721. Piston Packing.—Edward F. F. Roberts, Baltimore, Md. September 22, 1903. Filed May 13, 1902.

739,740. Speed Indicator for Automobiles.—John W. Sutton, Brooklyn, N. Y. September 22, 1903. Filed June 20, 1902.

740,069. Vehicle Tire.—William O. Worth, Chicago, Ill. September 29, 1903. Filed September 18, 1902.

740,195. Oil Engine.—Henry Soeldner, East Williamsburg, N. Y. September 29, 1903. Filed January 5, 1903.

739,924. Motor Vehicle.—Harry M. Pope, Hartford, Conn. September 29, 1903. Filed October 26, 1899.

T. A. BRYSON,

COLUMBIA BICYCLES,
OLDSMOBILES AND RAMBLERS,

242 BULL STREET,

SAVANNAH, GA., Sept. 22nd, 1903.

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T.A.B.-K.

Yours truly,

T. A. Bryson

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to
Motor
Interests

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Cloud-Burst Interferes with Endurance Run.

An almost continuous rain during the first four days of the Endurance Contest, at times increasing to a heavy downpour, that flooded the valleys of the Susquehanna and the Genesee, through which the route lay, added immensely to the natural difficulties of the route. The result was that after the first night only a small fraction of the actual contestants succeeded in reaching the specified night control—some running all night and some stopping over at intermediate points, while in one case a contestant actually camped out on the road in the rain, a mishap having occurred to his car in a desolate mountain district with no human dwelling within walking distance. Long detours have been found necessary by some of the delayed cars to avoid washed out roads, and on account of bridges being swept away by the flood. To give an idea of the extent of the downpour and the consequent floods, it may be stated that the rainfall in New York city on Thursday, the second day of the contest, was about 6½ inches, the greatest rainfall for a day ever recorded. Train service was interrupted between New York city and Philadelphia and between New York and Buffalo. In many instances freight trains were run onto railroad bridges to prevent the latter from being swept away by the swollen rivers.

The first day's run was moderately severe. The roads were mostly good in the forenoon, but this stage included a climb to near the summit of the Catskill Mountains and was quite long—130 miles. It is gratifying to record that only a single car out of thirty-four starters failed to complete this stage.

The second day the difficulties began in earnest. The first part of the day's work consisted of climbing to the summit of the Catskills, which, with the severe grades, the heavy condition of the roads and the

continuous downpour, was a most difficult task. Then followed the descent of the mountain range, and though the down grades were easier for the motors, it was a most perilous trip, owing to the slippery condition of the narrow roads, often curving around a mountain side, with a steep high wall on one side and a deep gorge on the other, in most cases protected only by a frail board fence.

The extreme conditions necessitated some modifications in the rules. It was found early in the run that if each car which failed to make a night stop by midnight was disqualified there would be too many disqualifications, and this rule was therefore rescinded. On the other hand, it was not possible to change observers on a car which was perhaps 100 miles from official headquarters, and the rule calling for daily change of observers was therefore only partly carried out. It was also concluded that the awful plastering of mud on the cars after several days' run through clay and dirt, into which the wheels sometimes sank a foot deep, could not fail to seriously affect the operation of the mechanism, however well the more delicate parts were enclosed, and it was therefore decided on Sunday to allow the machines to be cleaned.

In recent discussions on the subject of endurance contests, and also in connection with this run, the phrase "as nearly as possible under actual touring conditions" has frequently been used. It is an indisputable fact that actual touring conditions do not prevail in this run. As examples of the most arduous kind of touring might be mentioned the transcontinental tours which have been made the past summer. Two of those who made the transcontinental journey are driving machines in this run, and one of them stated that the conditions in the contest were very much severer than those in the trip across the continent, as in that trip they stopped and sought

shelter when it rained and did not run much at night.

That the arrangements did not always work as smoothly as would have been desirable is largely due to the abnormal weather conditions and can hardly reflect on the management, though we believe the possibility of heavy rain should have been given more consideration than it evidently was. There is one point, however, that has come under our notice which is open to criticism. At the conclusion of the first day's run a preliminary official statement was given out relating to the performance of the contest in the first stage. In this statement some cars were credited with an apparently clean record, and for some others the causes of stops were given. In some cases it was stated that "observer does not comment." It appears to us decidedly wrong that it should be left to the observers to decide whether any information should be given out or not, and it certainly is an injustice to some of the contestants to have their mislapses and breakdowns made public, while those of others are kept secret.

Those who have succeeded in reaching Cleveland and have now undoubtedly surmounted by far the greater part of the difficulties have certainly made a fine demonstration of endurance of both car and operator. We do not wish to detract in any way from the splendid performance of those cars which have been most successful, but it is an obvious fact that in this run the personality of the driver played too great a part. For practical reasons a run should be so organized that the drivers' qualifications have the least influence on the results, and everything, as nearly as possible, depend on the qualities of the cars.

Handicapping in Races.

Until now the handicapping in track races has generally been unsatisfactory, and has often given rise to friction. With a view to avoiding any such trouble in the recent Yonkers races the very progressive race management appointed a committee of scientists to devise a scientific handicapping formula and apply it to the cars entered for the handicap race.

The results of this first application of the new formula have not been altogether satisfactory, and the work of the committee has been held up to ridicule by some anonymous writer, who either was personally interested or had a grievance to ven-

ilate. In the derivation of the formula the cylinder dimensions, gearing ratio, wind resistance and sundry factors were taken into account, but too little allowance was evidently made for increased resistance to motion at high speed, and the smallest and least powerful vehicle, which enjoyed the greatest handicap, won by a very considerable margin.

The fundamental idea of the handicapping formula has never been explained, but we presume it is to calculate the possible speed of each car from the data supplied as near as possible from present knowledge of the variation of the different resistance factors with speed, and then reduce the distance for the slower cars in the proportion of their speed to that of the fastest car. If this calculation could be accurately made, the result of the race would depend only on the skill of the drivers and the temporary condition of the machines.

Unfortunately the experimental data for making a close calculation of the possible speed of a high powered machine are lacking. The wind resistance depends not only upon the extent of the surface, but also upon its shape, and does not lend itself to accurate calculation, and almost no data are obtainable regarding the power absorbed by vibration at high speeds. From the great increase in power necessary to gain only a small increase in speed from about 60 miles an hour it is evident that at such high speed the air resistance and the vibration are the chief resistance factors—just the two about which the least is known.

It will thus be seen that there are many difficulties connected with the derivation of a rational handicapping formula upon scientific lines. Better results could undoubtedly be obtained by estimating the probable speed of a car from that of the best track performance of a car similar with respect to cylinder capacity, weight and extent of stripping.

A Tire Wrinkle.

In a recent issue we remarked that the so called tire protectors, consisting of extra treads composed of leather, fabric, metal strips, etc., had so far not proven a success, and expressed the hope that some improvement would soon make its appearance. A French automobilist now announces that he has found it an excellent practice to use old worn out covers of

a size larger than those actually on the wheels, over the latter, which greatly increases the immunity from puncture and saves the regular tires from wear. The old tire must be from a wheel about 2 inches larger in diameter, but about 1 inch smaller in sectional diameter. Holes are punched through the clincher part of the cover opposite the wheel spokes, and the extra cover is secured to the spokes with brass wire.

It is evident that the additional weight detracts from the specific power of the car, and the loosely fitting tread and its mode of attachment do not enhance the car's aesthetic features, but the item of tire expense and the annoyance of frequent punctures and bursts are so great that the average automobilist would be willing to pay this price if it would afford appreciable improvement in these respects. At present old tires have little value, as old rubber cannot be used again for tires, but only for the manufacture of cheap rubber goods. Many users would undoubtedly be glad to learn of a way of getting additional use out of their discarded covers, and a trial of the method here described is recommended.

Calendar of Automobile Dates and Events.

- October 7 to 15—New York-Pittsburg Endurance Contest.
- October 10—Race meet of the Automobile Club of Philadelphia.
- October 22 and 23—Automobile Races of Macon Fair Association, Macon, Ga.
- October 31—Brighton Beach, New York, Race Meet.
- December 10 to 25—Paris Automobile Exhibition.
- January 15 to 23—Madison Square Garden Automobile Show.
- February 6 to 13—Chicago Automobile Show.

A clause will probably be inserted in the rules of next year's "Reliability Trials" forbidding the operation of competing vehicles by women. This year there was no such rule, and two machines had lady drivers, but it has been found that the operation of competing cars by ladies encourages disregard of the rules by the observers. How, for instance, could a gallant young observer be expected to stand by idle or repose under the nearest shade tree when the fair chauffeuse is burning her fingers tinkering about a recalcitrant motor, making frantic efforts at the crank and—well, endure conditions which would lead men to use bad language? He certainly would lend a helping hand, rules or no rules.

N. A. A. M.'S ENDURANCE RUN, NEW YORK TO PITTSBURG.*

The Start.

With the sky darkened and overcast and a fine drizzling rain falling, thirty-four of the forty-two automobiles entered in the New York-Pittsburg endurance contest, under the auspices of the National Association of Automobile Manufacturers, started on the first stage of the long run on Wednesday morning, October 7.

Owing to the delay at the Weehawken Ferry and the necessary waiting for boats, all the contestants did not arrive at the starting point on schedule time, but struggled in from the ferry and climbed the long hill leading up to the Point View Hotel, where the officials awaited their arrival at irregular intervals.

Some of the cars were on hand as early

off deserve credit for the manner in which they accomplished that task.

INCIDENTS ON THE FERRY.

The ferry literally coined money carrying over the stream of autos, contesting and independent. There were some narrow escapes from collision in the ferry house and on the boat by operators jockeying for position. There were also several lively uphill sprints to the starting point, up the long grade from the ferry to the Hudson County Boulevard. One or two of the contesting cars, it was noticed, were fitted with speedometers, in order that the operators might have some idea of how nearly they were conforming with the speed ordinances en route.

The element which did all the speeding

Comparing the cars entered in this run with those that journeyed to Boston last fall, there was noticed a general tendency to increase wheel base, make axles and chains heavier and to broaden bearing surfaces. There was also a more generous distribution of grease cups and oil holes, haphazard methods of lubrication being abandoned.

The scene at the start was one full of life and motion, indicative on every side of the fullest and

MOST COMPLETE PREPARATION

for the big trip. Extra tires were in evidence on every machine, some cars carrying two or three outer shoes and a considerable number of inner tubes. Spark plugs, wire connection, extra parts, such as valves, knuckle joints, nuts and bolts, chain links, and in several even larger parts



GENERAL VIEW OF THE START.

as 6 o'clock, while the last starters, the Fredonia entries, did not reach the top of the hill until 7:50.

NO CROWD AT START.

The large crowd that invariably gathered at Fifty-ninth street and Fifth avenue when the A. C. A. competitive runs were started from there was missing, but not missed. The movements of the officials and of the operators of cars were not hampered as in the past, and everything went off in apple pie order, speedily, concisely and without a hitch. Those who had in charge the work of getting the cars

in previous contests was not on hand, however, and it was the general impression that this run would not be marred by bids for yellow journal recognition for hare-brained speed records.

AMERICA'S BEST IN THE RUN.

It was gratifying to note the absence of freak cars, the manufacturers evidently having come to the conclusion that it is better to keep such affairs out of endurance contests until their reliability has been established. The big imported cars of the \$10,000 and \$15,000 type, which have competed in all previous runs, were conspicuous among the contesting vehicles by their absence. No one seemed to regret the fact that the owners of these racers were not going to compete, and it was generally believed that the high speed nuisance would not appear during this run.

were carefully stored away in view of a possible emergency.

The drivers of the big cars were not a whit better prepared, however, than were those who were to pilot the little runabouts through the run. It was a great comparison to note the vast difference in the proportion of the entries. A towering 2,500 pound touring car, carrying seven passengers, and listed to cost \$7,000, stood beside and overshadowed a tiny runabout, weighing 880 pounds, carrying two passengers and costing \$650, and yet both machines were to go over the same roads under practically the same relative conditions, and both would, it was expected, cover the ground without mishap. One had a little cylinder $3\frac{1}{2}$ by 4 inches, the other four cylinders, each 5 by 6 inches, to propel it, and the operator of one was equally as confident as the operator of the

* The endurance run is reported for THE HORSELESS AGE by Harry B. Haines, who follows the contestants by train; Albert L. Clough, passenger on No. 14, Arrow car; Harry E. Dep, passenger on No. 31, Haynes-Apperson car; J. G. Perrin, passenger on No. 25, Knox car, and Dudley S. Greene, who accompanies the contestants in his own car.

other that his car would go through all right.

After the first day's run it appeared that the little cars were holding their own nobly and did not need to ask odds of their larger fellow contestants when it came to a question of getting there.

SPARE PARTS STOWED AWAY.

One fact that was particularly noticeable in looking over the cars was that the usual open display of extra parts and sundries made in previous runs had been avoided this time. All of the contestants carried an extra outer shoe tied somewhere on the machine, but the inner tubes, extra parts, etc., were safely stowed away in baskets or other carrying compartments and kept out of sight.

In every case the manufacturers had taken the precaution of protecting their motors from mud and dust with leather or canvas covers.

The Northern entries even went so far as to carefully protect the front of their machines from being scratched by the extra tire carried by covering the woodwork with felt.

Several of the multi-cylinder cars entered, it was noticed, used the spark gap as a preventive against possible ignition troubles. There was also a pronounced improvement in the wiring of the cars and the protection of the sparking system from short circuiting as a result of dampness.

Heavier wires, doubly insulated, were invariably used with heavy copper terminals. In many cases the battery and spark coil boxes on the larger machines were protected by rainproof and damp-proof rubber coverings. The wisdom of this course was demonstrated at the start, for despite the damp conditions prevailing there were no motor or ignition troubles with any of the cars entered, a really remarkable showing.

There was

LITTLE OR NO TINKERING

before the start, the officials getting the machines off so soon after they arrived at the starting point that there was no time for anything more than a hasty use of the oil can and a hurried turning down of grease cups.

Every machine behaved excellently in getting over the line, and apart from a general use of too much oil, with the accompanying smoke and smell, there was nothing to mar the performance.

The first batch of cars to be started lined up in the following order in front of the Point View Hotel: Nos. 14, 15, 4, 2, 36, 3, 5, 16, 6, 18, 17, 9, 10, 39, 40, 23, 25, 13, 41, 15 and 34.

Several of the cars were being operated by the manufacturers and inventors, a circumstance indicative of the interest taken by them in the contest.

The only lady passenger in any of the machines was Mrs. A. L. Riker, who sat beside her husband in a Locomobile touring car. The Pierce Arrow, No. 14,

was the first to be started, and sped down the road, followed by the cheers of the small crowd of spectators and autoists who had gathered at the start. The other cars followed at half minute intervals until thirty-two cars had been started. There was a lull then until a few of the late contestants arrived.

OBSERVERS PROMPT.

It was a good thing that all concerned that there were no "kid glove" observers on hand to desert, all but one being on hand promptly to start. The observer for No. 18 was late, and the man for No. 42 was sent in his place, No. 18 later going out on machine 42. This was the cause of the only hitch in connection with the start. Observer No. 1 was also assigned to car No. 3.

Each machine in the run was decorated with from two to four license numbers on the rear of the car and on the front lamps, and also with flags bearing its name. One of the Knox entries had the lamps fairly plastered, carrying the numbers 4052, 1605 and 375, in order to comply with the various laws in different States.

The automobilists in every car were liberally supplied with advertising souvenirs of various sorts, distributed among them before the start.

Two pilot cars started out at 5 in the morning to mark the roads with confetti. One was a White steamer operated by Windsor T. White and the other the car loaned by the George N. Pierce Company, operated by William Nicholson, who had with him a mechanic.

OFFICIAL RECORD OF START.

No. 14, Pierce—C. L. Sheppy, operator; Herman H. May, mechanic; S. B. Palmer, observer; A. L. Clough, passenger; started at 7 o'clock sharp.

No. 15, Pierce—P. P. Pierce, operator; George Ulrich, mechanic; H. W. Chapin, observer; 7:30.

No. 4, White—George S. Waite, operator; R. J. Schmidt, mechanic; S. D. Waldron, observer; 7:01.

No. 2, Columbia—B. B. Holcomb, operator; H. B. Erskank, Jr., mechanic; A. P. Warthington, observer; John Donovan and J. C. Kerrison, passengers; 7:01:30.

No. 36, Locomobile—A. L. Riker, operator; M. O. Douneil, mechanic; J. A. Crittenden, observer; Mrs. A. L. Riker, passenger; 7:02.

No. 3, Columbia—L. Duffy, operator; A. L. Fitzgerald, mechanic; R. L. Morgan, observer; C. H. Fenner and Edward F. Bolinger, passengers; 7:02:30.

No. 5, White—Webb Jay, operator; J. J. Hantah, mechanic; H. C. Farr, observer; 7:03.

No. 6, White—Paul H. Dunning, operator; O. A. Preston, mechanic; Ira S. Barnett, observer; 7:03:30.

No. 16, "Old Pacific"—T. E. Fetch, operator; C. H. Lowe, observer; 7:04.

No. 17, Rambler—Edward Collier, operator; M. C. Parshall, observer; 7:05.

No. 9, Toledo—M. H. Winters, operator; N. H. Blythe, mechanic; A. B. Henley, observer; H. H. Mundy, passenger; 7:05:30.

No. 10, Toledo—S. W. Saules, operator; J. W. Rollins, mechanic; F. S. Dey, observer; 7:06.

No. 39, Oldsmobile—C. Roberts, operator; R. S. Drake, observer; 7:06:30.

No. 40, Oldsmobile—D. J. Wurgis, operator; H. W. Jeffrey, observer; 7:07.

No. 23, Knox—H. M. Davis, operator; C. H. Torrey, mechanic; W. Collins, observer; 7:07:30.

No. 24, Knox—J. Edward Cowan, operator; S. W. Beach, mechanic; E. M. Herbst, observer; 7:08.

No. 25, Knox—F. H. Fowler, operator; F. M. Dampman, mechanic; H. B. Reynolds, observer; J. G. Perrin, passenger; 7:08:30.

No. 13, Phelps—L. J. Phelps, operator; J. J. Baker, mechanic; George Grant, observer; 7:09.

No. 41, Oldsmobile—L. L. Whitman, operator; W. E. Wright, observer; 7:09:30.

No. 35, Starns—F. B. Starns, operator; J. G. Patten, mechanic; A. C. Schultz, observer; W. L. Elkins and Herman H. Kuntz, passengers; 7:10.

No. 34, Northern—Albert Ducois, operator; D. W. Webster, observer; 7:10:30.

No. 18, Rambler—Arthur Gardner, operator; H. H. Everett, observer; 7:11.

No. 29, Haynes-Apperson—George O. Barnes, operator; A. C. Esselstyn, observer; 7:25.

No. 30, Haynes-Apperson—Frank Nutt, operator; F. E. Spooner, observer; 7:25:30.

No. 31, Haynes-Apperson—H. Lauterman, operator; James Artman, observer; Harry E. Dey, passenger; 7:26.

No. 33, Northern—A. W. Hall, operator; R. E. Olds, observer; 7:26:30.

No. 32, Northern—V. M. Anderson, operator; H. E. Bradner, observer; 7:27.

No. 27, Franklin—H. L. Winter, operator; R. R. Owen, observer; 7:27:30.

No. 26, Franklin—William H. Bex, operator; H. T. Thomas, observer; 7:28:30.

No. 28, Franklin—John Wilkinson, operator; George Tarkington, observer; 7:29.

No. 37, Holley—George M. Holley, operator; W. G. Pierce, observer; 7:30.

No. 42, St. Louis—B. P. Dorris, operator; B. P. Kuhn, observer; George Hafer, Jr., passenger; 7:33.

No. 19, Fredonia—Charles B. Gaither, operator; D. R. Darris, observer; Morris Hawkins, mechanic; 7:55.

No. 20, Fredonia—F. L. Thomas, operator; J. H. Lake, observer; 7:58.

THE NON-STARTERS.

The following machines did not put in an appearance for the weighing in on Tuesday: 1G, Columbia; 7F, Peerless; 8F, Peerless; 11B, Stevens-Duryea; 12B, Stevens-Duryea; 21F, Searchmont; 22A, Covert, and 38G, Springer; Nos. 1, 7, 8, 11 and 12 were officially withdrawn, for what reason is not known. The Searchmont car was not started, owing to the failure of

the company, and the Covert and Springer machines were not ready.

The First Day's Run.

AS SEEN FROM THE TRAIN.

After the last car had been started on the run the writer joined a party of officials going by train to Pine Hill—M. L. Downs, official weigher and examiner; A. B. Tucker, official press agent; C. H. Gillette, superintendent of observers, and several assistants for garage work. A number of newspaper men were also in the party. L. L. Fest, superintendent of garages, left on an early morning train for Pine Hill, and was on hand when the first contestants arrived in the afternoon. The other officials, not having left until a later train, were late in getting to the finishing point of the day's run.

At Newburgh several persons boarded the train, and it was reported that No. 9, Toledo, had been the first car to reach that place. No. 20, Fredonia, was reported stalled and in trouble, but this, of course, was not official.

At Kingston the report was received that the first car there had arrived at 12:20 o'clock, a number of others following shortly after, and that twenty-one cars had passed there by 2:30 p. m.

The railroad trip from Kingston to Pine Hill was made via the Ulster and Delaware road, the tracks of which run parallel with the road followed by the autos for some distance.

At Stony Hollow a number of small

boys reported that thirty machines had passed there before 3 o'clock.

Nos. 33, Northern, and 42, St. Louis, were seen from the car window near that place, plowing through the heavy country roads at a fair rate of speed despite the mud.

It was evident from the wheel marks in the road that several other cars had passed over it before these.

Shortly after this time No. 16, Old Pacific, was seen in the distance, and at Olive Branch station No. 3, Columbia, and No. 17, Rambler, were seen. Between Walton and Mount Pleasant No. 9, Toledo, was noticed.

Just before reaching Phoenicia several other cars were seen going along at a good rate of speed. They were too far away to distinguish their numbers, but the men on the train waved to the autoists and they returned the salutation.

ON CAR NO. 25, KNOX.

Our car started at 7:10. The first part of the day's run, over the excellent Hudson County Boulevard, was a genuine pleasure, only slightly marred by the fact that the atmosphere was so hazy, which shut out the greater part of the commanding view otherwise obtained from this road. On entering Hackensack, at 7:35, we passed No. 5, White, stalled on account of tire troubles. At 8 o'clock we passed No. 17, Rambler, drawn up alongside the road, the operator cranking. We arrived

at Palatine Hotel, Newburgh, at 10:22, having accomplished the 59½ miles in three hours twelve minutes.

After a stop for lunch we made a new start, at 11:05, and when 64 miles out we noticed that several cars had taken a wrong road. A few miles farther, while going up a 13 to 14 per cent. grade, the operator of our car used his low gear for the first time, having ascended every hill before that on the high gear. Near Milton the roads became very slimy, causing many cars to skid badly. Near St. Remy the road became a trifle dusty again, the soil evidently being very absorbent here, or perhaps this section had not had any rain for a considerable time.

At Eddyville, at 1:25, we noticed No. 34, Northern, with the rear left hand mudguard brace broken and the mudguard swinging. Kingston was reached at 1:40, and there we saw No. 18, Rambler, stopped, evidently for lunch. From Kingston on for 10 miles the left hand side of the road was laid with two parallel tracks of stone flagging about 12 inches wide, evidently intended for heavy haulage purposes, but now in bad repair.

From Kingston to Pine Hill the roads were generally very muddy, and near Olive Branch, at 2:30, it began to drizzle. Between Shokan and Beechford the road (or rather mountain trail) followed the curves of the mountain on the right and a gorge to the left, and was positively dangerous, as the surface was so rough and muddy and there was a possibility of a side slip over the edge of the road causing a fall of



SCENE AT THE START.

15 or 20 feet to the rock bed of the gorge stream below.

Between Phenicia and Allaban one of the cylinders of our car, which until then had been running faultlessly, ceased to work, and upon investigation the operator found that the exhaust valve spring on the rear cylinder had broken and necessitated a replacement. The duration of the stop was only ten minutes. This happened on a very bad stretch of road, so bad, in fact, that it was very difficult to get the car out of the muddy ruts in the middle of the road to leave room for other cars to pass while the spring was being replaced.

We entered the garage at Pine Hill at 4:11, making a total running time of 8 hours 18 minutes for the 130½ miles. The Knox car on which the writer had a seat is very comfortable riding, having a roomy surrey seat, and in addition to the four occupants it carries three suit cases and a camera in the rear compartment. As far as the mechanism of the car is concerned, it is practically the same machine as the one which competed in the commercial vehicle contest last spring, at which time a description of it was given in THE HORSELESS AGE.

ON CAR NO. 31, HAYNES-APPERSON.

We were a little late at the start in Weehawken, owing to delay at the ferry, and were officially started at 7:21. The engine worked perfectly and the vehicle rode finely, which, combined with the good roads, made the riding almost equal to that of a "Pullman."

In Hackensack a street urchin sought to encourage us by shouting to us that we might "catch 'em yet." At 8:16 we stopped to put on our raincoats, as it had commenced to rain. We reached Newburgh at 10:47 and immediately got our lunch, leaving there at 11:44. At 11:55 we met with the first incident of importance—a dog got under our wheels, rolled over and over several times, and then picked himself up and ran off. He lived to bark another day, but I do not believe he will do so again at an automobile. At 12:50 we passed Pierce No. 15, which in kindly turning into the gutter to let us pass stalled its engine. This stop should not be penalized.

Ulster Park was reached at 1:33 and St. Remy at 1:52. Kingston, at 2:10, came near being a finish for us. The streets were one mass of slimy mud, and as we were making a right angled turn our wheels slid around and brought us up against the curb with great violence. The observer either jumped or was thrown out, landing on his feet. It was a severe test of the endurance of the wheels, but they were not affected in the least. It was also a good test for the axle.

Oliver Branch was reached at 3:42, where we passed No. 13, Phelps, stopped. At Bechford, at 3:18, we passed No. 3, Columbia, in trouble, and shortly afterward our own troubles commenced. Our pump

chain had jumped the sprocket some time before, and we were running weaker and weaker and developing a very pronounced thump in the engine, and to ease it oil had been fed very liberally. The oil tank had not been filled at noon, and the consequence was that it ran dry and we had to stop and fill that up, replace the pump chain and fill the water tank from a roadside puddle by means of a drinking cup—every minute lost being one point lost and irrecoverable. Well, we lost twenty-two points for the starter, the stop beginning at 3:54. In the meantime we were passed by

It was then found that the pump driving shaft had been bent. Mr. Haynes, who followed the run by train, was informed of the trouble and said he would try to secure another pump shaft from a local machine shop.

At the Pine Hill Control.

The scene at the finish at Pine Hill was a rather unique and interesting one. The officials in charge of the run had been unable to find any sort of a garage and had selected a lot in the centre of the village for storing the cars over night. The ground was fenced in and the officials stood guard at the entrance, assisted by the village constable, an interesting old fellow of the Rip Van Winkle type.

About every man, woman and child in the village was out to welcome the automobilists. The dining rooms of the hotels were decorated with autumn leaves, and colored lights were hung around the porches and lawns.

Tired, wet and dirty the contestants piled out of their mud covered machines at the garage and made a bee line for their hotels for a bath and something to eat. It had been a hard day's run for the operators, as their cars continually skidded on the wet roads and there was a great loss of power from slippage of the driving wheels.

At 7 p. m. the rain, that had been holding off all day, started with a vengeance and the lucky contestants who were under shelter were sympathizing with their less fortunate brothers still on the road.

OFFICIAL LIST OF ARRIVALS

The following official list of arrivals was issued by the press committee:

The following cars arrived at the garage at Pine Hill 9 to 6:30 p. m.: No. 2, Columbia; 9, Toledo; 35, Stearns; 10, Toledo; 34, Northern; 29, Haynes-Apperson; 26, Franklin; 16, Packard; 27, Franklin; 25, Knox; 24, Knox; 18, Rambler; 36, Locomobile; 40, Oldsmobile; 39, Oldsmobile; 14, Arrow; 4, White; 13, Phelps; 42, St. Louis; 30, Haynes-Apperson; 33, Northern; 3, Columbia; 15, Pierce; 17, Rambler; 32, Northern; 23, Knox; 31, Haynes-Apperson.

Up to 8 o'clock the following additional cars had reached the garage at Pine Hill: No. 41, Oldsmobile; 28, Franklin; 5, White.

The only cars still out at that hour were: No. 19, Fredonia; 20, Fredonia; 37, Holley; 6, White.

The White car, No. 5, Webb Jay operator, reported his delay due to tire trouble. He said he had blown out four inner tubes during the day. At 8:30 the Holley car, No. 37, was reported within easy distance of Pine Hill. The White No. 6, was also said to be only a few miles from the garage. The Fredonia cars were not reported.

SOME OF THE TROUBLES.

THE HORSELESS AGE representative, mingling among the observers and contestants, was able to gather considerable



FIRST DAY'S ROUTE.

cars Nos. 3, 32, 15, 30 and 17. At 4:26 we stopped one-half minute to replace the pump chain, and at 4:42 five minutes for the chain and to refill the water tank. Shortly after another stop of five minutes was made for the same reason. At 5:16 we had a three minutes' stop owing to the same cause, and at this point some ladies presented us with a large bouquet of flowers. At 5:30 we had another stop of ten and one-half minutes, and after a final stop of six minutes we reached Pine Hill at 6:05.

interesting information regarding stops and incidents of the run.

The roads during the afternoon had been dangerously slippery, and many skidding episodes were reported. One machine skidded into a tie post near Newburgh, smashing it, but not injuring the car. The new steering checks on the Knox cars certainly proved valuable in this run. Several machines were ditched in gullies, but as far as could be learned no serious accidents occurred.

An unentered White steam car and the Knox No. 24 had a rather strange experience after leaving Kingston. Two horses got out in front of them on a narrow road and the autoists, not wanting to stop, tooted their horns and continued along. The horses took fright and started on a run down the road. There was no place for them to turn off and they were chased by the autos for 3 or 4 miles, when the animals, nearly exhausted, ran off the road into a field.

sharp stone cut the shoe. It was patched up, but blew up twice again and the tire was then taken off and the machine run on the rim. No. 6, White, also had tire troubles and came in running on the rim, having been forced to take one tire off.

At 9:30 it was reported that No. 37, Holley, which had been delayed by tire troubles, had made repairs and would finish. The official report of the operator on Oldsmobile No. 41 showed that 20, a Fredonia, was laid up with a broken radiator, caused by crashing into the rear of the Olds. That car was also slightly damaged. No. 13, Phelps, reported having been delayed by a cracked spark plug porcelain. Car No. 23, Knox, had a stop at Suffern, N. Y., as a result of ignition troubles.

SYNOPSIS OF OFFICIAL REPORT.

According to a preliminary official report the following cars had apparently no penalized stops: 9 Toledo, 10 Toledo, 15 Pierce, 16 Packard, 24 Knox, 26 Franklin,

St. Louis, gasoline feed tank valve closed by jar (very slight).

The Start from Pine Hill.

The second day dawned with a leaden sky, promising rain. It had rained off and on during the night, and the roads were reduced to a pasty consistency half mud and half autumn leaves, which offered anything but a good grip to rubber tires. A number of contestants, among them Old Pacific, the Franklins, the Knox No. 23, Olds No. 41, Haynes-Apperson No. 29 and White No. 4 were provided with ropes and straps for the rear wheel tires to give the wheels a grip.

Both the Fredonias had arrived during the night. The damaged radiator of No. 20 was repaired at a shop near the scene of the accident, and the car reached the garage at 11:15 p. m. The damage to the radiator had been sustained in a rear end collision with one of the Oldsmobiles, the



WHITE PILOT—R. H. WHITE DRIVING. SECRETARY UNWIN, OBSERVER.



PIERCE ARROW PILOT CAR—F. A. NICKERSON DRIVING.

Car 18, Rambler, after reaching the garage removed a front tire for repair, having punctured it. A box of tires shipped by train by a leading concern was brought to the garage and distributed among two or three of the larger cars, there being both outer covers and inner tubes in the consignment. The Toledo double cylinder car was reported to have narrowly escaped a collision, as a result of skidding while coming through Newburgh.

B 23, the single cylinder Knox, was held up for fifty minutes by the exhaust valve sticking. It was necessary to take the valve off and file it down before the machine could continue. Howard M. Davis, the operator, accomplished this job in remarkably short time, considering that the valve and casting were both hot.

No. 5, White, came into the garage before 8 o'clock without a tire on the right rear wheel. They had run on the rim for over 45 miles, having had three long stops as a result of trouble with the tire named. A

29 Haynes-Apperson, 32 Northern, 33 Northern, 34 Northern, 39 Olds, 40 Olds. The following had tire troubles only: 4 White, 5 White, 35 Stearns. Following is a list of troubles experienced by other machines (according to this report) which are not mentioned by our reporters: No. 2, Columbia, removing and cleaning carburetor; No. 3, Columbia, stopped for gasoline and removing spark plugs; No. 6, White, in addition to tire trouble, vaporizer was replaced; No. 13, Phelps, several stops for repairs to engine, springs, etc.; No. 17, Rambler, engine troubles; No. 18, Rambler, throttle and tire troubles (slight loss of time); No. 23, Knox, lost muffler set screw and cleaned carburetor; No. 27, Franklin, replaced oil cup (a few seconds); No. 28, Franklin, several stops for tires and engine; No. 30, Haynes-Apperson, ran out of gasoline; No. 36, Locomobile, straightened crank without use of tools (slight delay); No. 41, Olds, oiling and tightening clutch (slight delay); No. 42,

driver of the Fredonia stating that the driver of the other car made a very sudden stop. The Holley car, which proved a little too light and underpowered, had not yet arrived, and was last heard from at Kingston, where the rear axle was said to have been broken.

Some of the observers and operators overslept a bit, and there was considerable trouble at the garage entrance, no operator being allowed inside to touch his car until his observer arrived. Tom Fetch and his observer were first to enter the enclosure.

The machines were drenched by the heavy rain, the high wind having blown the rubber covers off a few of them. When permitted to get to their cars the operators and observers in a number of cases made ponchos from the rubber covers in order to protect themselves from the rain. The local hardware store had its supply of clothes line completely depleted, and a number of operators skirmished through the village buying rope and straps to use



ONE OF THE OLDS ENTRIES.

on their driving wheels. However, most of the cars were supplied with these before leaving.

Most of the observers had provided themselves with lunches, as did the operators in the cars, to be prepared for all emergencies and also in some cases to save the time of stopping for lunch. Despite the downpour of rain, all connected with the cars were bustling around in preparation early. There was the usual oiling and tightening up, and in not a few cases chains had to be adjusted, having stretched in the first day's run. The pilot cars, as usual, had started at 6 o'clock to mark the course.

At 6:51 No. 15, Pierce, pulled up the steep slope leading out of the garage and up the still steeper hill to the village street and was started on its way. Official Weigher "Bundy" Downs inspected each car in front of the official headquarters at the Pine Hill Hotel, seeing that all the ballast was on board and also that the required number of passengers was carried. No. 39, Olds, was next off, smoking badly, as a result of too much oil. It had a rather hard time getting up the heavy grades. No. 16, "Old Pacific," got away next.

It was noticeable that the cars with straps or ropes on their driving wheels made much better progress up the hill to the official garage than did the others. Car 9, Toledo, was stalled on the hill, the driving

wheels spinning around in the mud. It was necessary for the operator to back down the hill and take a flying start to get up. The Stearns car experienced this same difficulty. No. 5, White, was also stalled on the hill, apparently not generating steam fast enough. The operator was able to get it under way again after pumping water for a minute. Some of the contestants found it necessary to hire a team.

It was noticeable that all the big cars were provided with sprags to hold them on hills in case of a stop. An Olds stopped on the hill and started back despite the pressure on the brake. Several men held it until the engine was speeded up and the clutch thrown in, pulling the car up the grade all right. The motor on Franklin No. 27 stopped as a result of too rich a gasoline mixture just as the car was leaving the garage. The brakes were set and the operator got out and started the motor again on the first turn.

The departure was in the following order, at intervals of from one to three minutes: 15, 39, 16, 10, 40, 17, 18, 13, 14, 29, 2, 9, 24, 35, 25, 26, 42, 34, 30, 36, 33, 5, 4, 28, 23, 32, 3 (8:08). At this time there were six cars not started and the officials, with the exception of one who was left behind, made a run for the only train on the U. & D. road during the day, among them THE HORSELESS AGE representative.

The Second Day's Run.

SEEN FROM A CAR WINDOW.

The tracks of the U. & D. road run parallel with the contest route for a considerable distance, and the confetti strewn along the road by the pilot car could be plainly seen. The roads all along this hardest and most hilly part of the route were reported to be in extraordinarily bad condition. The rain beat down in torrents without a moment's let-up from morning to night. The first move away from the Pine Hill Hotel was up an 8 to 14 per cent. grade, and hills up to 10 and 15 per cent. were met all along the line, the run ending with a 15 per cent. grade just outside of Binghamton.

A short distance from Grand View a White steam car was seen ascending a steep hill, the operator working with some lever as if pumping water. Another car was stalled on the hill, but was too far off for the number to be seen. Between Fleischmanns and Arkville No. 3, Columbia, was seen, evidently stuck in the mud. The driving wheels were revolving, and all the passengers were out and pushing hard. At Arkville, at 9:15 a. m., it was unofficially reported that twenty cars had passed, a remarkably good showing considering the terrible condition of the roads.

At Unadilla the writer and several other men traveling by train stopped and went over to the Hotel Bishop to await the arrival of the cars there. The White pilot car got in shortly after 1 o'clock, and after a few minutes' stop continued on its way.

The first of the contestants to reach Unadilla were No. 5, White, and the Stearns car, shortly after 1 o'clock, the Stearns being slightly in advance. Neither car, it was reported, had met with any accidents or had any stops en route. The Stearns car had a very narrow escape from puncturing the right rear tire, having picked up a horseshoe nail. Luckily the nail did not cut through into the inner tube.

At 1:54 No. 10, Toledo, drove into the hotel yard. The occupants reported that one of the Columbia cars, a rear tire on it having blown up, skidded into the ditch and stuck there. Two horses and the Toledo car, 9G, were secured, and pulled the car back on the road. The tire was then replaced and the run to Unadilla continued. No. 9, Toledo, arrived there at 2:18 o'clock. Another of the Whites came in shortly after. No. 40, Olds, was next to arrive, and was given an ovation, being the first runaway in.

The gasoline supplied the cars was kept in 5 gallon cans out in the open and a quantity of rain water had formed on each one. If some of the machines are not stalled as a result of watered gasoline it will be more due to good luck than good management.

The Stearns car left at 2:15 and the White car at 2:27. No other cars had arrived at 3 o'clock, at which time it was



STEARNS CAR AT THE START.

necessary for the men following the run by train to leave for Binghamton.

LOCOMOTIVE ACCIDENT.

Everything went along nicely until Santataria Springs was reached, when the train came to a standstill with a jerk. Upon investigation it was found that the piston rod on the right side had broken off short, tearing out the piston head. The engineer was hard at work dissecting the piston and fixing it up. It was finally taken out, and after forty-five minutes' delay the train continued, the engine running on one cylinder.

Binghamton was reached before 5 o'clock. The White pilot car was the first machine to arrive, stopping in shortly before 5 o'clock.

ON CAR NO. 25, KNOX.

We left Pine Hill at 7:25 and began the day's trip by climbing the very long 8 to 14 per cent. hill leading out of the village, which would have been a difficult climb even without the rain. We continued climbing for several miles, a number of down grades being sandwiched in between the rises, passing through very beautiful autumn mountain scenery.

At 8:15 we passed through Margaretville, where we passed the Phelps car running with the front axle bent. Soon after we passed No. 17, Rambler, with a right rear wheel wobbling considerably and one deflated front tire.

Dunraven was reached at 8:35, having made 14 miles in one hour ten minutes. There had been considerable running on the low gear since leaving Pine Hill, and at 9:02 our operator stopped one minute to oil the transmission shaft, which seemed to be acting queerly. Finally, near the top of Palmer Hill (a tough proposition of 8 to 15 per cent.), we stopped forty-five minutes to free the transmission sliding sleeve, and found that a split pin or cotter had



SECOND DAY'S ROUTE.

been lost out of one of the pins on which the dogs actuating the high speed clutch are hinged.

About this time it began to pour, and the road began to look like a mountain brook with streams running down the ruts and forming deep pools, in which the cars would plunge, throwing up showers of water, some of which would hit the muffler and exhaust piping, causing clouds of steam to burst forth from beneath the car.

Fast driving was impossible with the roads so slippery, and even with the low gear in the cars would skid around considerably. In approaching Andes our machine almost turned around in one slip while going down a slight decline. The high speed clutch gave more or less bother all the way to Delhi, which we reached at 1:20, soaked to the skin.

Just outside Delhi we passed the Phelps car with the rear axle disengaged from the body and the operator working in the rain. In Delhi we heard of a St. Louis which was laid up for repairs making a new gear shaft ($1\frac{1}{2}$ inch) sheared right off climbing a hill. No. 24, Knox, had lost or broken a hinge pin at the front end of one distance rod just out of Delhi.

As an illustration of the slow traveling necessitated by the heavy condition of the road it may be mentioned that the pilot cars passed through Delhi at 9 a. m. and through Unadilla at 2 p. m., making five hours for 27 miles.

After getting lunch at Delhi and warming up at a log fire, we started at 3:55. Just a few blocks away from the Edgerton Hotel, in making a sharp right turn, we heard something snap, but did not find out what until 2½ miles out. Continued up a very steep to to 15 per cent. grade, on which the St. Louis had broken its gear shaft. Rain still fell in torrents. When 2½ miles out the operator found that the distance rod on the left hand side was broken, and took it off and continued for one-half to 1 mile, when the motor skipping badly on account of water splashing on the spark plug (finally stopping one cylinder entirely) and chain being very loose on account of broken distance rod, we turned around to retrace our way to Delhi. One cylinder only working, the engine did not have power enough to drive the car up the grades, so all occupants got out and waded through the quagmire. When nearly back to Delhi the lame cylinder picked up, and we drove into the town under full power at 5:30, where we stopped for the night.

At 10:30 p. m. the distance rod was repaired. The rain was still pouring down. I learned that No. 28, Franklin, got 5 miles beyond Delhi and then caught fire and burned up. Operator John Wilkinson hired a team to return to Delhi. He lays the cause to a split in the muffler and leaking gasoline. Two Fredonia cars are stopping here tonight. A Colum-



A KNOX.



AT THE START.

THE PHELPS.

bia car arrived shortly after to, but decided to continue tonight.

S. A. Miles telephoned from Binghamton that cars can go on and get to Buffalo as soon as possible, running on Sunday if necessary.

ON CAR NO. 31, HAYNES-APPEPSON.

We did not get started this morning until 9:55, owing to repairs being made on pump. On examining the car it was found that the upper main leaf in one of the rear springs had been broken, but as there were no facilities for repairing at Pine Hill it was decided to go carefully on to Fleischmanns, a few miles farther on. The tires we wrapped with chains and the start was made up a long, steep, slippery hill (5 to 15 per cent.) to the summit of the Catskills (2,000 feet—it was noticeably colder here). Four miles from Pine Hill the town of Fleischmanns was reached and the repair made. This was accomplished by clamping a wooden block between the upper and lower springs at the hinge. It made a very satisfactory repair job, well planned and well executed, and will probably last as well as a new spring.

Shortly after leaving Fleischmanns our pump chain again came off, and after replacing soon jumped off again, so we made no further efforts in that line, as every time it came off it was liable to spring the shaft, as it did the day before. This compelled us to stop every mile or two and re-fill the tank and cool the engine. Water was at hand everywhere, and the compiler of the road description might have saved considerable printers' ink by simply making a note at the beginning: "Water all along the route." This would not apply to gasoline, however, as several have found out to their sorrow by finding themselves

out of that very necessary fluid when "a long way from home," and the towns are not very close together, either, in this section. We have been fortunate enough thus far to escape such a predicament. We had no pail to dip water, but managed to purchase a dipper from a farmer.

After a long, hard struggle we reached Andes, more dead than alive, soaked through and through and very hungry. At the hotel there a hot cup of coffee and a juicy porterhouse steak improved our feelings immensely. A stop of five hours was made at this place to make an idler to run on the chain, and we then made another start for Binghamton after dark. It was still raining and the roads were very slippery, but we drove cautiously, and about 10 o'clock reached Delhi. Here we were warned that it was very dangerous to continue in the dark, so we decided to stop over. We found about fifteen machines stopping over there, including two Franklins and one each St. Louis, Knox, Northern and Fredonia. One of the Columbias, delayed by ignition troubles, stopped over at Andes.

The next morning, taking an early start, we again headed for Binghamton. The previous night and this morning we were troubled with the front cylinder misfiring, which was laid to the igniter, but was finally found to be due to ice forming in the vaporizer, owing to the rain being drawn in and then freezing. We had to stop a number of times to clear it out. We finally stopped at Franklin and bought a piece of hose, which we connected to the vaporizer inlet and led it so it would suck the air from around the engine cylinder. This settled the freezing problem, as far as the vaporizer was concerned.

About this time our pump chain commenced to misbehave again, but we man-

aged to limp into Unadilla, where we got a new chain. Between Franklin and Unadilla we tried to

FOR A STREAM

which had spread out over the approach to the bridge. We got into it where the water was 30 inches deep, and there our engine stalled. We managed to hail a man with a horse, who towed us out. I climbed onto the horse first and was taken over to the bridge with my camera, where I took a few views of the machine.

At Pine Hill Elwood Haynes had taken the place of Mr. Hopkins, passenger on our car, the latter going on by train. At Unadilla Mr. Wright (of the Knox Company), our official observer, left us to take a place as passenger on one of the Knox cars, to replace a deserter.

We left Unadilla after supper time and reached Bainbridge near to. Our pump worked for about 6 miles and then gave out, and we ran the remaining 5 miles without circulation, barely crawling along when we reached the Central House in that town. We were here advised that the last three machines that passed had to be towed a short distance beyond there, as the water was so deep. We had already decided to remain there on account of the pump trouble. We remained until about 3 o'clock, having a rope drive affixed to the pump. While waiting a Fredonia, Rambler, Columbia and one or two others either came in or passed. Mr. Kellar joined our force to act as passenger with Mr. Haynes. I took a number of pictures of the flood. Pumpkins and corn have been coming down the Susquehanna River by the hundred, the former at times being almost as plentiful as in the cornfields we have been passing. The river is said to be the highest since 1885.



"OLD PACIFIC"—TOM FETCH DRIVING.



A RAMBLER.

The Arrival at Binghamton.

The drivers of the pilot cars upon arriving at the official garage on Washington street gave notice that about 5 miles from Binghamton there was a long stretch of narrow road banked on one side by a deep ditch and on the other by the Susquehanna River, which under the slippery condition of the road was a very dangerous stretch. On hearing this the officials dispatched a man from Binghamton with a megaphone and a red lamp to stay there all night to caution the contestants as they passed.

After the pilot cars, the first of the contesting cars to arrive was No. 5, White, at 6:43. It was closely followed by No. 40, Oldsmobile, the first gasoline car to finish. This little runabout had to climb up the side of a hill outside Binghamton to get around the Stearns entry, which was stalled in a ditch. The arrivals up to 9 o'clock were as follows (official): No. 5, White, 6:43; 40, Oldsmobile, 7:25; 14, Arrow, 8:05; 10, Toledo, 8:07; 9, Toledo, 8:08; 2, Columbia, 8:13; 35, Stearns, 8:40; 6, White, 8:50. The following later arrivals were observed by THE HORSELESS AGE representative: No. 36, Locomobile, 9:13; 4, White, 9:15; 15, Pierce, 11:16; Packard, Old Pacific, 11:01. One of the Ramblers arrived at about the same time.

The Stearns car had been first in at Unadilla and left there in good shape. While running along a bad stretch of road near Chenango Bridge it got off the road into the ditch—one version of the accident stating the cause to have been skidding and another that the driver turned out too far to let one of the Toledos pass. The result was a bent steering knuckle, and much effort was necessary to get the heavy machine onto the road again. Luckily no one was injured. Mr. Stearns upon arriving said he would be able to continue in the morning without repairs.

It was reported by telegraph at 8 o'clock that the Phelps car was out of the contest, having met its quietus at 10:35 in the forenoon while climbing a steep hill 30 miles west of Pine Hill, near Lake Delaware and 6 miles east of Delhi. The trouble was caused by the breaking and tying up of the transmission gear. Operator L. J. Phelps stuck to the car, but the observer, H. W. Chapin, secured a farmer to drive him 6 miles in a rig to get lunch and 8 miles farther to the nearest station on the D. & H. road. The press car was also reported in trouble with tires. It finally got in at 9:45.

When No. 36, Locomobile, arrived, at 9:15, Mrs. Riker, who had stuck to the machine all day despite the bad weather, was loudly cheered by the crowds at the garage. She said that the run had been a most eventful one, full of narrow escapes from skidding.

No. 4, White, was next in, the operators and observer drenched to the skin and shivering with cold. All the contestants were rushed to the Bennett House upon arriving and given a warm drink, and as far



GROUP OF OFFICIALS AT THE WEIGHING IN.

as possible dry clothes. They were mud covered and wet and presented a sorry looking sight. No word of complaint escaped them, however, despite the severe ordeal through which they had passed.

About 20 miles east of Binghamton No. 2, Columbia, in trying to make a turn, skidded on the soft mushy surface and went down an 8 foot embankment. The occupants of the car had a narrow escape. After a delay of over an hour the operator was able to get his car back on the road, and arrived in Binghamton at 8:12. It was assisted in getting back to the highway by the Pierce, No. 14.

Columbia No. 3, it was unofficially reported, was stalled near Pine Hill with gear troubles and water in the gasoline. A Columbia car unofficially entered was also reported stalled by one of the passengers, a newspaper man, who had ridden 22 miles in a farm wagon to the nearest railroad station.

At 11:15 o'clock word was received that a number of the cars were at Unadilla and would stay there for the night. Mr. Downs, official weigher, and Mr. Fest, official in charge of the garages, were seen and asked if the run would be postponed or delayed if the majority of the machines did not get in during the night. The answer was an emphatic "No," it being stated that the start would be made at the regular hour no matter who got in, as it would be an injustice to the men who had finished to hold them. There seemed to be no probability of the operators and observers being fit for work after the day's severe test.

It was unofficially reported shortly before midnight that a Franklin had caught fire and been burned near Unadilla. No details could be secured.

It was also stated unofficially that the road beyond Unadilla had washed out and been closed by a road inspector as dangerous, cutting off the autos completely.

At Bath there was much talk of postponing the contest for one day to enable the belated cars to get in, rest up the contestants, wait for the rain to stop, and let the roads dry up a little, and it would have been a good thing to do; but officials were ready to start cars at 7 o'clock, and at half past the first car started.

At Binghamton.

The garage at this place was in an open lot fenced in by a high canvas, the usual cordon of officials guarding against possible interlopers in the garage being on hand. A large crowd was in waiting to welcome the machines.

The Press Club at Binghamton took the press men in hand and gave them every attention, throwing open their handsome clubrooms.

The Binghamton automobilists, who had planned a big spread and smoker for the contestants, were sadly disappointed at the absence of their guests. The poor fellows on the road, shivering in the cold, were sympathized with on all sides. The rain stopped shortly after 7 o'clock and it grew steadily colder.

At 9:30 the smoker started, but beyond those who had followed the run by train there were few of those connected with the run present. The Binghamton automobilists were out in force and partook of the good things provided for their guests and also enjoyed the vaudeville. Their hospitality deserves recognition, and it was to be regretted that they were so unfortunate with their entertainment.

In many cases the operators, observers and passengers on the cars that crawled into Binghamton were so cold and weak that they were scarcely able to stand. The officials at the garage had whisky and other stimulants on hand, and, after having given the men a drink, hustled them over to the official hotel, where a hot meal awaited them. All the men who had traveled over the course from Pine Hill were unanimous in their opinion that it would have been impossible to have arranged a run over worse roads or under more unfavorable conditions.

T. E. Fitch, the operator of Old Pacific, who drove that car across the continent, standing in the lobby of the Hotel Bennett said: "In all my automobile experience I have never had a harder run or continued for such a distance over roads so uniformly bad. In my trip from San Francisco to New York I struck short stretches of road that were slightly worse than the average of today's route, but I never covered so long a stretch of horrible road. At times the steps on our rig (which are

15 inches from the ground) were under water."

Mr. Fitch stopped for an hour en route to change his clothes, preferring to accept the penalization to ruining his health. This was during the most terrific storm of the day, which practically made driving an impossibility. He, like most of the other operators, had nothing but small oil lamps to run by over the most dangerous roads. Mr. Fitch paid \$5 for a pair of acetylene bicycle lamps, but these refused to burn after a short time, and he continued with the oil lamps.

Numerous stops were necessary in order to find the arrows and confetti marking the roads.

Windsor T. White said that his car had been in mud and water up to the hubs at places along the route. In some places the mud was nearly a foot deep; in others the water was over a foot deep, and in many places there were washouts.

The cars that got into Binghamton certainly made a wonderful showing. In all cases the mud had got into the steering gear, making the operation of the cars most difficult, and the skin on the hands of some of the operators was chafed and cut by the mud on them having been rubbed by their long sleeves.

It was twenty minutes after midnight when car No. 39, Oldsmobile, came creeping up to the garage, the operator and observer half frozen to death. They reported horrible road conditions and said that most of the contestants had decided to stop at Unadilla over night. No. 30, Haynes-Apperson, arrived at the garage a little later and had the same story to tell.

The rain was still pouring down at this time, and a few minutes later the whole town was aroused by the breaking out of a big fire in the local theatre, which made things lively for a while.

The Start from Binghamton.

Friday morning dawned with a leaden gray sky, the rain still falling. Despite this a large crowd gathered at the garage and waited for the contestants to arrive. Still sleepy and exhausted by the ordeal through which they had passed, the automobilists turned out bravely, ready to continue the hard fight on toward Buffalo.

The various machines that had managed to get to Binghamton had stood out in the pouring rain in the uncovered garage, and were anything but pretty to look at or inviting to sit in. There was not a clean spot on any of them, and in many cases the mud had caked on the hubs almost half way up to the rims of the wheels. Every oil hole exposed was covered over and had to be literally "dug out." Particular care was taken by all the contestants to most thoroughly lubricate their cars.

Strange to note, up to this time there was little trouble experienced in starting motors, despite the damp weather, which

speaks well for the steady improvement in wiring and ignition devices.

At the time of the start for the run to Bath there were in the garage Nos. 2, 4, 5, 6, 9, 10, 14, 15, 16, 18, 30, 33, 35, 36, 39, 40 and 47, seventeen in all.

The missing machines were reported as having met with all sorts of mishaps. It was stated unofficially that the Franklin that caught fire and burned up had been running with a cracked muffler from Pine Hill and had also experienced some trouble with the motor backfiring. The body and basket carrier on the machine were burned up and the machinery was been shipped back to the factory. The ignition wiring on the transcontinental Oldsmobile was short circuited in many places, and for that reason this car couldn't leave Binghamton at the regular time.

The Third Day's Run

En route from Binghamton to Bath by train various reports were received as to the progress of the machines. The first machine to reach Corning was one of the Columbias, which passed East Corning at 1:30. This car had reached Elmira at 12:27. Car 35, Stearns, got there at 3:35, and the Pierce Arrow went through at 3:58.

The first car to reach Elmira passed through that place at 12:07, and up to 2:30 in the afternoon only thirteen others had arrived there. A great crowd lined East Water street in this place and welcomed the autoists.

All along the entire route the contestants have been treated with the greatest courtesy and consideration by the residents. In country districts fruit and flowers have been showered upon them by pretty girls who lined the roads. In Corning a great crowd lined Market street, and it was necessary to call out the police to keep the street clear, so that the autos could pass. They were all loudly cheered. The public all along the route seemed to take a great interest in the contest, and were more than willing to do anything in their power to help any of the machines that were in difficulty. It was evident from the receptions tendered the men in the country districts that the prejudice against autos is fast disappearing.

The roads from Binghamton to Bath were very bad and heavy along the entire route, and principally so near Corning, although 14 miles east of that place the roads began to improve, having been out of the area of the big storm. Every day of the trip seems to pile up difficulties that demonstrate that the run is as severe a test of the endurance of the contestants as of the machines.

Following is the order of arrival at Bath: No. 2, Columbia (5 p. m.); 35, Stearns; 14, Pierce; 4, White; 5, White; 16, Old Pacific; 10, Toledo; 15, Pierce, and 18, Rambler.

This made only nine of the original thirty-four, and the missing twenty-three were strewn along the road in various

stages of repair and breakdown, but in most instances with a determined crew at work rushing things along in the hope of getting into shape and pressing on toward Buffalo. Their struggle against hard luck and the bad roads was indeed a heroic one, and even if this run is the last endurance contest ever held, as many seem to believe it will be, it is an effort that will go down in auto history as a most valiant struggle for victory.

The Bath automobilists gathered at the garage on the Fair grounds and cheered the arrivals. There was also a large crowd of spectators on hand, but the police kept them from blocking the entrance to the garage.

All the men were tired out, but the ordeal had not been as severe as the run of the day before. The contestants as they arrived were escorted over to the official headquarters at the Nichols House and given dinner. The weather having cleared off, the Soldiers' Home band gave a concert in the park in the evening. Many of the automobilists were also entertained in private homes.

S. A. Miles, the general manager of the run, upon arriving at Bath, ascertained that arrangements had been made to store the machines in the fair grounds, where they would again be out in the open all night. He at once decided that it was inadvisable to leave the cars out, and arranged to pile them all in a large barn near the grounds, stating that the contestants would not be forced to store their machines in the open any more.

WITH CAR NO. 25, KNOX.

We stopped over at Delhi Thursday night, where it rained steadily all night and was pouring as usual at 6 a. m. After eating breakfast I looked up the operator and observer on Knox 25 and found them still in bed. They did not seem to know whether they would continue on to Binghamton or not, and I concluded that the surest way to get to Binghamton was by train. There having been so much complaint about continuing I rather expected to find the run abandoned at Binghamton, and wanted to get in at the finish and get what data I could.

R. E. Olds, of the Olds Motor Works, boarded the train at Walton and reported that the Columbia car, on which he acted as observer, had been deserted at Andes, and he and a passenger had left in a stage for the nearest railroad station. He was very much incensed at the idea of choosing such a route for an endurance test, and said by the time news reports regarding the effect on the progress of the cars reached outside points the impression on the public would be that of the Binghamton *Republican*, which printed glaring headlines: "The Horse Still Stands Near the Head in Endurance Contest." He said he would stop his cars at Binghamton if he arrived in time.

We reached Binghamton at 10:45 and found the officials ready to board the train for Bath, having started sixteen cars in the pouring rain. I visited Whipple's auto station and found No. 39, Oldsmobile, waiting to have its engine looked over, as it was lame in getting into town; also a Haynes-Apperson with engine cylinder broken away from its crank case. Evidently the connecting rod had broken and caused the trouble.

I then took a train back to New York. When we reached Lordville, the train was delayed by a washout. After twenty-four hours' halt the train proceeded as far as Middletown, where another stop of twenty-four hours took place. We finally reached New York by going 100 miles out of our way to Kingston and down the West Shore. Reached New York Monday morning at 1:30, fifty-five hours behind time.

Across the main thoroughfare coming into Bath a big sign with the word "Welcome" was hung. From two of the corners were suspended within easy reach pint bottles of champagne, evidently prizes for the first car arriving. Mr. Holcomb, who arrived first, refused to stop long enough to get the wine.

The Start from Bath.

A crowd was on hand to see the autos off. It was cloudy, but there was every indication of fair weather during the day. It was also much colder. It was noticed at the garage that there was another tightening of chains and also a liberal use of wrenches on all sides. Being excluded from the garage the press men could, of course, note little that was done in the way of preparation.

There was some difficulty in getting the cars into shape for the start, and in some cases the driving chains were so badly cut from grit that they had to be tightened considerably in order to prevent them from jumping the sprockets. One of the large cars entered has been obliged to get new driving chains since starting, it being stated that the chains were more since leaving New York than they would in 4,000 miles of ordinary use.

The following cars started in the order given between 7:30 and 10:30: Pilots, 6 a. m.; No. 35, Stearns; 15, Pierce; 5, White; 10, Toledo; 18, Rambler; 9, Toledo; 4, White; 14, Pierce; 16, Packard; 41, Olds; 2, Columbia; and 30, Haynes-Apperson.

When all the machines were under way the officials and press men started for their train, which was scheduled to leave Bath at 10:15 a. m. Owing to the heavy storm and floods they were obliged to wait five hours for a train. It was a great comparison to see automobiles making their scheduled stops when the railroads were tied up.

The officials finally got off and arrived in Buffalo at a late hour in the afternoon.



THIRD DAY'S ROUTE.

The Fourth Day's Run.

Various reports were received en route as to the progress of the machines. The continual rains had made the roads like mortar beds, and the automobiles crawled along much like flies scrambling up a slippery waterglass. The White pilot car was reported as having passed through Le Roy at 12:30 on its way to Buffalo. The last 50 miles of the run to the Queen City was about the only half decent roads the autoists had.

At Mount Morris it was reported that ten automobiles had passed through before 10 a. m. Among these were the White pilot, a Columbia and a Toledo, which went through without stopping. The Pierce Arrow pilot car met with an accident a short distance outside of the town, dropping into a hole and breaking both front springs. A stop of forty-five minutes was made at a blacksmith shop, where repairs were made and the car was ready to continue.

The White pilot car was reported to have reached Gettysburg, N. Y., at 10:30 a. m., accompanied by the White, No. 5. The Pierce pilot left at 10:44. The Columbia was next in line, going through at 11:10, while the Toledo passed at 12. The Stearns entry, No. 35, came nearly meeting with a dangerous accident near Dansville. Mr. Stearns was driving the car down a steep grade at a high rate of speed. There

was a bridge at the bottom, and when he applied the brakes the car skidded sideways into a gully. Mr. Stearns, by a herculean effort, managed to get the machine back into the road again, only to skid once more, this time sending his rear axle badly. Luckily no one was injured. The machine was jacked up and the axle taken out and carried to a blacksmith shop, where it was heated and straightened, and, after being reinforced, was put back into place and the run to Buffalo continued.

At Buffalo a garage had been secured at the corner of Ellicott and Main streets, in an open lot there. It had been the intention of the members of the Buffalo Automobile Club to erect a tent on this lot in case of rain, but when they came to contract for the canvas covering the dealer wanted three prices for the use of the tent, and they decided not to rent it.

It was raining as usual when the time for the arrival of the autos came, and it was decided to have the garage changed to the place of the Queen City Automobile and Carriage Company, who tendered the use of their place free of charge to those on the run.

The Buffalo Automobile Club appointed a committee to meet the contestants as they came into town and take care of them. The gentlemen on this committee were President W. H. Hotchkiss, Dr. T. J. Martin, E. T. Hall, J. B. Eccleston.



FOURTH DAY'S ROUTE.



NOON STOP AT NEWBURGH.

H. M. Poole, Dr. Lee H. Smith, George S. Metcalf, D. Lewis, E. R. Thomas and Secretary F. J. Wagner. A large party of automobilists also went out to Bowmansville to meet the contestants.

The first machine to reach Buffalo was the White pilot, which arrived at 2:29, followed closely by the Pierce pilot car. No. 5, White, driven by Webb Jay, arrived at the same time. The first machine to get into town was No. 2, Columbia, driven by B. B. Holcomb, which got in at 2 o'clock, but was unable to reach the garage owing to a most unfortunate accident.

While coming down Genesee street, near Fillmore avenue, at a fair rate of speed, Mr. Holcomb was forced to apply his brakes quickly in order to avoid striking a wagon. The big car skidded on the wet asphalt, turned completely around and then smashed into the curb and broke the axle off close to the left wheel. The car stopped short, but luckily no one was hurt. Not

much time was spent in crying over the matter, but arrangements were made to get the wrecked machine into Keller's barn, and after it had been taken there a telegram was sent to Hartford to have a new axle sent on at once by special messenger.

Mr. Holcomb, in speaking about the accident, said: "We were coming along at a moderate rate of speed with the left wheels on the rough pavement and the right ones on the slippery asphalt. A team pulled out in front of me and I was obliged to put on the brakes hard.

"We skidded, and as we slewed around we looked and saw an undertaker's establishment with a coffin in the window. We all wondered which of us would land in that. The wheels hit the curb hard and then the car settled quietly down. Luckily none of us were thrown out, and when we got out we found the axle was broken."

The official report issued at the Iroquois Hotel gave the order of arrival at Buffalo

and the official time as follows, up until to p. m.:

No. 2, Columbia, 2 o'clock; 5, White, 2:29; White pilot car, 2:51; the Arrow pilot car, 3: 15. Pierce, 4:39; 14, Pierce, 4:47; 6, White, 6; 16, Packard, 6:05; 10, Toledo, 6:45; 35, Stearns, 7:04.

There were some rather lively scenes at the garage, the Buffalo newspaper men raising a kick because they were excluded with everyone else and refused admission to the place.

The White pilot car made some repairs, putting new rear springs in, the old ones having flattened out. Old inner tubes had been used to prevent the springs from coming together entirely and breaking. The left rear wheel of the Pierce Arrow pilot car was badly sprung and out of true.

A number of telegrams from contestants who were not in at Binghamton and Bath were received by Mr. Miles at Buffalo. Arthur Gardiner, the operator on Rambler 18, who smashed a front wheel in a skidding accident, telegraphed from Avon, N. Y., October 10, that he would surely get into Buffalo during the night. It was also reported that Haynes-Apperson 30, Olds 39 and Toledo 10 were on their way from Bath.

An official report issued late Saturday evening gave the following information:

"Late reports by telephone tonight at the Iroquois Hotel were that five cars left Binghamton today and will stop in Owego tonight and push on to Buffalo tomorrow (Sunday). The cars are a Knox, a Fredonia, a Columbia, a Haynes-Apperson and a Franklin.

"Oldsmobile No. 40, which was driven up to last night by D. J. Wurgles, but which he was obliged to abandon at Elmira on account of sickness, was taken in hand today by R. R. Owen, who will drive the car through to Buffalo, and will undoubtedly arrive before nightfall tomorrow."

Toledo No. 9, which suffered a delay 15 miles east of Bath last night by reason of a broken bearing of the rear hub, has been repaired, and its operator, M. W. Winters, telephoned to Bath today that he would push on and get into Buffalo tomorrow.

The Locomobile, No. 36, driven by A. L. Riker, is not out of the running, as was at first reported. Mr. Riker wired today that he would push on and arrive in Buffalo tomorrow. He had a rough experience last night when the accident to the car occurred. He and Mrs. Riker, with the observer, Ralph Morgan, believed themselves to be in the wilderness, and a tent was constructed of rubber ponchos and saplings, under which Mrs. Riker spent the night, while the operator and observer slept under trees. When they awoke this morning they found that they were within a quarter of a mile of a farm house occupied by very hospitable people. Mr. Morgan reached Bath today and came on to Buffalo tonight. Mr. Riker will travel without an observer and make affidavits concerning his stops.



LUNCH AT THE PALATINE, NEWBURGH.

Other telegrams received showed the metal of the men on the run. They follow:

"Short circuit. Leave here soon. Had fine trip here."—R. W. Spangler, Elmira, October 10.

"Leave here 1:45. Axle O. K."—F. B. Stearns, Danville, October 10.

(Mr. Stearns, as stated, arrived at the Buffalo garage at 7:04.)

Looking over the cars in the garage, each and every one of them showed the hard usage they had received. All of them, when the motors were started, groaned and wheezed. It was evident that some dirt at least had gotten into the bearings and was cutting them. The investigation as to wear and tear on bearings and parts that is to be made at Pittsburg will no doubt be very interesting.

At Buffalo.

The contestants were all quartered in good shape at the Hotel Iroquois, and after a bath and a meal they were all ready for the smoker and luncheon given them by the Buffalo Automobile Club. The Queen City automobilists were out in force and proved themselves to be a crowd of jolly good fellows. They had several very good vaudeville performers present, who entertained the crowd.

It was at first intended to have the smoker at the Ellicott Club, but owing to the fact that alterations going on there were not completed this idea had to be abandoned.

The clubmen at the smoker were headed by President Hotchkiss and Secretary Wagner, of the Buffalo Club. Brief addresses were made by Mayor Knight, of Buffalo; President Hotchkiss, of the Buffalo A. C.; Dr. Truman J. Martin, President Doolittle, of the Toronto A. C.; President Richmond, of the Rochester A. C.; Mr. Nickerson, driver of the Arrow pilot car, and others.

It was after midnight when the autoists finally disbanded.

There was little automobile activity around the official headquarters at the Iroquois on Sunday, no one but the official stenographer putting in an appearance much before noon. Shortly after that hour the official press representative began to get busy, and the following rather interesting information was given out.

BUFFALO, N. Y., Sunday, October 11.

General Manager Miles, of the N. A. A. M., announced this morning that contestants who arrive in Buffalo before the time of tomorrow's start will be allowed to clean and adjust their machines without penalty.

About half past 7 this morning it was reported that Whitman with the transcontinental Oldsmobile had left Bath, N. Y., at daybreak. The two Franklin machines, Nos. 26 and 27, left Bath at 8 o'clock today and will be in Buffalo before nightfall. About 10 miles east of Bath one of the Franklin cars, driven by Bex, fell through



START FROM PINE HILL ON THURSDAY MORNING.

a bridge and was entirely submerged, but was gotten out and overhauled without serious delay.

(From Whipple, Binghamton, 1 p. m.)—No. 25, Knox, now here and ready to start. No. 17, Rambler, arrived here at 9:40 a. m. and expects to continue. No. 27, Franklin, arrived at 9:15 a. m. Saturday and left at 10:30 same day. No. 20, Fredonia, arrived at 5:05 p. m. Saturday and continued at 9:30 p. m. No. 19, Fredonia, came and went at the same time. No. 3, Columbia, arrived at 8:45 p. m. Saturday and left at 5 a. m. today. No. 31, Haynes-Apperson, left yesterday.

(Awahga House, Owego, N. Y., 1 p. m.)—No. 3, Columbia, Nos. 19 and 20, Fredonia, passed through this morning. Two Northerns here, waiting for sprockets since Friday and Saturday. Operators had telephoned to New York for parts, but there has been no express out of New York for

the last forty-eight hours, and it is improbable that the machines will be able to continue. No trains are running, but the rain has ceased, and it is expected that the train service will be continued this afternoon, in which event supplies will probably be received Monday or Tuesday.

(Nichols House, Bath, N. Y., 1 p. m.)—Two small and one large car left here about 7 o'clock this morning.

Two of the cars were Oldsmobiles and the other a Toledo carrying four people. None here now. Kuhn, Nutt, Davis, Winters, Lytle, Spangler, Dorris, Hopkins, Barnes, Roberts and Lynn have all been here and left either on the machines or by train. Locomobile is still waiting at Campbell, 10 miles from here, for supplies, which are expected at any minute. They sent in word that they will start this afternoon.

(Later.)—Message received from a point about 26 miles further. One says that two



STOP FOR LUNCH AT DELHI

Oldsmobiles and the Toledo passed through, running well.

(Rathbun House, Elmira, N. Y., 1 p. m.)
—Two machines passed through about 8 o'clock last night, but did not stop. No record of their numbers.

All this was indicative of the fact that those who had met with trouble were not discouraged, and it was confidently expected that twenty cars would be ready for the start in the morning.

At 2 o'clock Sunday afternoon the members of the Buffalo Auto Club lined their machines up in front of the Iroquois and took all the officials, observers, operators passengers and all others connected with the trip for a ride about the city and out to the great Niagara Falls. The ride proved to be a most enjoyable one to those who participated, despite the fact that the day was cold and cloudy, as has been every day since the run started. The contestants would like to find out what hoodoo has set the weather bureau up against them.

There were very few large repairs made on Sunday at the garage, although some of the operators of the cars visited the place and made minor repairs and adjustments. The mud was cleaned out of the steering apparatus and driving chains as far as possible, and there was a general tightening up and oiling all around.

The operator of Columbia, No. 2, the car which skidded into the sidewalk on Genesee street, Buffalo, and broke a rear axle, worked all day getting the machine into shape. A special messenger arrived from Hartford with a new axle on Sunday afternoon, and before evening the car was repaired again and was run over to the official garage.

Toledo, No. 10, was obliged to replace its side driving chains, they being very badly worn and in danger of jumping the sprockets and breaking.

A large crowd waited around the garage all day and late into the night, and a detail of police kept them moving along. At 9:25 o'clock Olds, 41; Olds, 39, and Franklin, 27, came up to the garage together, the operators having been on the road for many hours. They were greeted with loud cheers as they ran up into the garage. The men running the machines were nearly exhausted from their long ride and hurried off to their hotels as soon as possible in order to rest up and be ready for the start in the morning. All the four machines were mud covered and looked much the worse for wear. The game fight made by them against heavy odds was commented on around the hotel. As late as 11:30 o'clock a number of cars were still on the road headed toward Buffalo.

From a list of cars in the run which had still a chance to complete the trip to Pittsburgh, issued by Press Agent Tucker on Sunday evening, the following is condensed:

The following cars were at that time in the garage at Buffalo: No. 2, Columbia; No. 5, White; No. 35, Stearns; No. 30,

Haynes-Apperson; No. 16, Packard; No. 18, Rambler; No. 6, White; No. 10, Toledo; No. 14, Pierce; No. 15, Pierce. No. 3, Columbia, left Binghamton on Sunday morning, and was reported passing through Owego. No. 9, Toledo, left Bath at 7 a. m. on Sunday, and reached the Buffalo garage at 6:40 p. m. Sunday. No. 17, Rambler, was at Binghamton at 1 p. m. Sunday. No. 19, Fredonia, left Binghamton at 9:30 p. m. Saturday and passed through Owego Sunday morning. No. 20, Fredonia, left Binghamton at 9:30 p. m. Saturday and passed through Owego Sunday morning. No. 23, Knox, was said to be at Elmira Saturday morning. No. 24, Knox, at Elmira Saturday afternoon, arrived at Bath at 5 p. m. Sunday. No. 25, Knox, was ready to start from Binghamton at 1 p. m. Sunday. No. 26, Franklin, left Bath at 8 a. m. Sunday. No. 27, Franklin, started from Binghamton at 10:30 a. m. Saturday, and left Bath at 8 a. m. Sunday, John Wilkinson, whose car was destroyed by fire, having taken Winter's place as operator on No. 27. Winter having been taken ill with fever. This car reached the garage at Buffalo at 9:25 p. m. No. 31, Haynes-Apperson, left Binghamton on Saturday. No. 32, Northern, was waiting at Elmira for sprockets. No. 36, Locomobile, was still at Campbell at 1 p. m. Sunday and expected to reach Buffalo at 10 a. m. Monday. No. 39, Oldsmobile, was at Bath Saturday evening; left there at 7 a. m. Sunday and reached the Buffalo garage at 9:25 p. m. Sunday. No. 41, Transcontinental Oldsmobile, left Bath at daybreak Sunday and reached the Buffalo garage at 9:25 p. m. Sunday. No. 42, St. Louis, was reported to be at Elmira.

The speeding of cars in the past few days of the run, which has led to numerous accidents, was discussed by the managers of the run, who decided that the dangerous speeding must be stopped. This conclusion was reached after these same officials had been driven down Main street, Buffalo, at the rate of 35 miles an hour. The police and the autoists of the Queen City seem to be on excellent terms, and speeding to any extent is allowed. The following order was issued to all observers Sunday night:

"To Operators and Observers—In all future stages of the run rule 16 must be strictly observed. Operators must not exceed a speed of 20 miles an hour. Observers must report any infraction of the rule. The penalty for disobedience is immediate disqualification.—W. L. Elkins, referee."

In order to quiet the fears of operators who were worrying about the condition of the roads between Buffalo and Erie, Pa., a telegram was sent to S. D. Waldron at Ashabula Depot, Ohio, inquiring as to how things were. The following reply was received: "Mr. E. T. Giffert, Hotel Iroquois: No rain. Erie roads hard, dry. Very little water. Reservation probably bad.—S. D. Waldron."

To show the worn out condition of the operators and observers in the run a little joke on B. H. Hogan, an observer, may be told. Mr. Hogan arrived in Binghamton about 2 o'clock Friday morning, leaving again soon after 7 a. m. The car to which he was attached did not reach Bath until late Friday night. Going to bed he slept through the pow-wow at the hotel, not waking up until 1:30 in the afternoon. Coming down stairs he looked at his watch, then wound it and asked someone for the time. Going to the office he inquired about breakfast, and when informed that it was afternoon could hardly believe it.

The Rambler, 18, in running between Bath and Buffalo, skidded, driving the front into a fence and taking off a front wheel. Mr. Gardiner telegraphed to the Rochester agency and procured another, completing the run to Buffalo, arriving about 1 a. m. Sunday.

(Continued on page 414)

The following is the official report of the weighing in of the cars on Tuesday last:

Name	No	Weight Pounds.	Passes.	Ballast Pounds.
Columbia	2	3,380	5	97 1/2
Columbia	3	3,320	5	86
White	4	1,980	8	74
White	5	1,865	8	104
White	6	1,760	3	None
Toledo	9	2,820	4	112 1/2
Toledo	10	2,180	3	95
Phelps	13	1,800	3	None
Arrow	14	1,980	4	None
Pierce	15	1,960	8	None
Packard (Olds)	16	2,400	2	138 1/2
Rambler	17	1,450	2	57 1/2
Rambler	18	1,410	2	52
Fredonia	19	1,780	8	None
Fredonia	20	1,400	2	70
Knox	21	1,650	8	12 1/2
Knox	24	2,540	3	177 1/2
Knox	25	2,400	8	150
Franklin	26	2,180	2	None
Franklin	27	1,195	3	None
Franklin	28	1,170	2	None
Haynes-Apperson	29	1,550	2	87 1/2
Haynes-Apperson	30	1,440	2	70
Haynes-Apperson	31	2,490	4	None
Northern	32	1,120	2	None
Northern	33	1,135	2	None
Northern	34	1,120	2	None
Stearns	35	3,184	5	46
Locomobile	36	2,800	4	27
Holley	37	880	2	....
Oldsmobile	39	970	2	....
Oldsmobile	40	965	2	....
Oldsmobile	41	1,000	2	....
St. Louis	42	1,700	8	....

The contestants brought in at the night controls reports of many kind acts of farmers and others along the highway. One farmer asked a number of contestants to come in and have a drink of his home made wine. In order to get up a steep, slippery grade a number of contestants were forced to appeal to farmers for help. Several refused it on the excuse that the roads were in too dangerous a condition for the horses. A good Samaritan finally was found in Charles Tilbury, of Union, who, more enterprising than his neighbors, hitched up a team of horses and did a lucrative business in towing.

Through the Run in a Competing Vehicle—Notes and Comment.

By ALBERT L. CLOUGH.

PINE HILL, October 7.

I consider myself as fortunate in having been designated as a passenger upon No. 14, a 15 horse power Arrow tonneau, manufactured by the Geo. N. Pierce Company, of Buffalo, N. Y. This car is equipped with a double cylinder De Dion motor carried in a square bonnet and with De Dion ignition apparatus and carburetors. The Mercedes form of cellular cooler with air fan, is employed. Three forward speeds are provided by means of a sliding transmission and cone clutch, and the drive to the rear axle is by means of enclosed bevel gears and flexible shaft.

Mr. Charles Sheppy, who drives the car, is one of the most careful and expert operators I have ever met. With the roads in the condition in which we have found some of them today, it is hardly possible to be too careful in approaching steep down grades, as the conditions for skidding have been almost perfect. His consideration for the horse drawn traffic on the road is worthy of emulation.

The record made by the car today is without a blemish chargeable to it. Absolutely no work has been done upon it, with the exception of the lubrication of the clutch mechanism during the lunch hour. There has not been a single explosion missed during the entire day, the gears have always engaged smoothly and without difficulty, and where the road surface was good all grades up to 6 per cent. have been taken on the third speed, while the second speed successfully handles all hills up to 11 or 12 per cent.

ON PINE ROADS.

This forenoon's run to Newburgh was entirely over fine roads and was absolutely uneventful. The 58 miles were covered in three hours, or at the rate of nearly 20 miles per hour. The "Arrow" is very speedy on the third gear, probably capable of over 35 miles per hour on the level, but is geared slightly higher than the average American machine of the same power, so that we were passed by quite a number of cars on the hills. The fact that our car, which started first from Weehawken, was the fourth to arrive at Newburgh, certainly speaks very eloquently for its efficiency in comparison with other higher powered cars. The machine was carrying considerable more weight than it was designed for, and showed conclusively that it possessed an abundant reserve of power.

I have not been accustomed to ride very much in tonneaus, and as I occupied one of the back seats today I had an opportunity of experiencing its riding qualities over rough roads. The tonneau passengers certainly sustain more than their share of the "bumps" which the "thank you marns" of the road produce, and riding therein for 120 miles over all kinds of



GARAGE AT BINGHAMTON.

roads causes one to doubt whether the tonneau is worthy to survive as a final form of American automobile. The tonneau seat is too nearly over the rear axle to be comfortable, no matter how smoothly the vehicle may appear to travel to the front seat passengers.

During the morning's run the roads were merely damp enough to make them "fast" and to effectually lay the dust, but in the afternoon we entered the rain area, where the roads were extremely greasy.

SKIDDING.

There must have been a good deal of skidding done by the cars at large and ours shared in the general depravity, but without causing any damage. In some parts of the road a skid would have had serious results, as the road was flanked by a sheer descent of 15 or 20 feet to the bed of a creek and was unprovided with a guard rail.

Starting as we did, first in the line, we had very little opportunity of observing the troubles experienced by the other cars. A single cylinder air cooled car was observed having some minor difficulty with its exhaust valve, and a large four cylinder machine was overtaken which evidently

had lost the use of two of its cylinders, as it could hardly travel. At last it stalled on a hill, and, starting backward for a short distance, nearly ran into our car.

Apparently there have not been as many ignition difficulties as would naturally be expected on so wet a day, and this speaks well for the late developments in sparking methods.

The operators must have been very careful in their driving today, as otherwise there would have been some accidents, and thus far none are reported.

SHORT OF GASOLINE.

Our car would not have been penalized at all today had it not been for the neglect to fill the gasoline tank at the noon stop. When just beyond Phoenicia the engine began to lose power and finally stopped. Investigation showed that the gasoline tank was empty, and one of the passengers had to return to the village on foot and secure a supply, when the run was finished in fine style. This incident casts not the slightest discredit upon the machine, the operation of which has thus far been perfect.

It is raining tonight, and if it continues this test will prove a most severe one upon



SCENE IN GARAGE AT BINGHAMTON.

the machines. If the cars continue to come through as well as they have today, it will be a very convincing demonstration of the practicability of the automobile even under adverse conditions.

BINGHAMTON, October 8.

The day's run from Pine Hill to Binghamton, 106 miles, is undoubtedly the most severe test to which automobiles have ever been officially subjected. There have been some severe hill climbing tests in the past and some runs which have involved muddy roads, but today has proved an unhappy combination of all the difficulties which can be presented to self propelled traction.

The route included the climbing of a mountain range with grades varying from 8 to 17 per cent, and the traversing of roads which were virtually continuous lakes of mud, in some cases nearly a foot deep in the ruts with muddy water, and as slippery as if they had been seas of cylinder oil. The roads were also unspeakably rough most of the way, and there were plenty of "thank you marm's" of all degrees of severity, covered with varying depths of water. Almost every mile of the road led along a creek or river, as this is about the only practicable layout for a highway on account of grades. There is thus a precipice on one side of the road varying from 10 to 30 feet, nearly all the way.

With roads so exceedingly slippery as these, this condition makes driving very dangerous. It will be little short of a miracle if there are no serious ditchings or overturns, as all the machines are skidding more or less. It is a question which type skids worse—the American or the French type. Perhaps no generalization is possible. Some operators insist that the heavy cars skid worse than the light ones. Some attribute it to the length of wheel base, but it is likely that weight distribution is the most important factor involved. It would be interesting to know whether the large flywheels of typical American type cars really confer any inherent steadiness due to gyroscopic action. The solution of the problem of preventing skidding will very likely receive an impetus from this test.

Traction increasing attachments, such as chains, have been freely used on the driving wheels of the cars today with some beneficial results. A better test of the endurance of the machines as regards the invulnerability of their ignition apparatus and operating parts to muddy water could not possibly have been afforded, as it rained continuously during the entire run, and for a large part of the time it simply poured. In the mountains we were treated to a hailstorm. The machine which possesses any exposed parts, especially about the ignition system, must have fared badly today; but fortunately such machines are now in the minority.

An intending purchaser may safely conclude that any machine that made today's

run successfully is capable of overcoming all road conditions which in fairness could be imposed upon an automobile.

The soil of this district is more of a clay than a sand, and hardly anything in the way of road materials could be more slippery. On the climb up the mountains a fine opportunity was afforded to study the advantages of the three speed gear over the two. The climb was continuous and of varying grade, and there were very few opportunities for any machine to use its highest gear. The two speed machines were forced to run on their low gears most of the time, and were, in general, easily distanced by those having an intermediate gear, which were forced to use their first speeds only occasionally.

Arrow car No. 14 ran with absolute perfection all the forenoon, and is worthy of the fullest confidence. No work of any kind was done upon it during the first half of the run, except the usual lubrication of the clutch mechanism at the noon stop. The engine did not miss a charge, and no working part failed to perform its functions perfectly. Changing of gears was so incessant and brake applications so frequent and severe that these parts were tested to the utmost.

During the afternoon's run a slight difficulty developed with the flexible connection of the pump and air fan, which subjected us to a few minutes' penalization. Our car also played the part of a good Samaritan in towing a less fortunate car out of the ditch. Had it not been for this latter stop we should have been the first arrival at Binghamton, and in fact I believe we were the second to arrive.

The roads from Franklin to Binghamton were even worse, if such a thing be possible, than those encountered in the forenoon.

The greatest credit is due Mr. Sheppy, the operator, for his skillful and cautious driving and his ability to make good time under the adverse conditions. Time after time, when skidding was severe, he saved the car from leaving the road when it seemed almost an impossibility.

For the first time on the run the cooling water has boiled, due to the large amount of low gear work, and a little had to be added at Franklin, where gasoline was also taken.

We were among the early starters, and thus did not have a great opportunity of noticing the troubles of others on the road. Some few of the highest powered cars passed us very early in the day and kept ahead, but it was hardly a day to show the superiority of the high powered vehicle in traveling ability, as the speed was strictly limited by considerations of safety.

We noticed the Columbia car, which had left the road near Delhi and had slid into a fence, but apparently without injury to mechanism or passengers. A little farther along another large car was seen jacked up, whether for a tire trouble or a mechanical difficulty we could not discern.

The arrival of the majority of the cars in Binghamton will be decidedly belated. This is a human endurance test as well as a mechanical one. Many of the operators and observers are thoroughly soaked, despite so called waterproof coats, and the occupants of cars which have no mudguards are carrying away samples of the fertile soil of Delaware County.

BATH, October 9.

Today's run, while infinitely less severe than that of the day before, has presented sufficient difficulties. With rain at the start, the roads were at first as bad as they have been at all, but as the day advanced they dried off considerably, and toward the last of the day's run more tolerable conditions were met with. Today has not proved the Waterloo of so large a proportion of the cars as did yesterday. We started from Binghamton so early and there were so few cars on the road that we saw nothing worthy of report during the day in the line of breakdowns.

The Arrow car ran all day long with its usual reliability. Beside looking after lubrication, a necessary adjustment of the timer contacts called for a few minutes' work. A car must be almost perfectly mud and water proof to go through these last two days without trouble. All parts are thoroughly enclosed, and the electrical arrangements are installed with the fullest attention to perfect insulation. This accounts for its exceptionally perfect ignition.

The Arrow is a very quiet running car. As the exhaust is sufficiently muffled, the operation of the transmission gears is barely audible, and there is a total absence of chain noise, due to the use of the shaft drive.

As we were following one of the pilot cars this afternoon it suddenly came upon a deep mud hole at the foot of a steep rise and stalled, requiring the help of one or two bystanders to help it out of the slough. We were forewarned and therefore forearmed by its experience, and succeeded in rushing the bad spot by keeping in the tracks of the leading car. Through the towns of Corning and Painted Post were seen the most disgraceful road conditions which I ever observed within the business portion of a town. We traveled the main streets of these towns in mud 6 inches deep on the low gear.

BUFFALO, October 11.

Last night's glimpse of the sun was deceptive as a sign of fair weather, as the morning was ushered in with rain, which has continued thus far. This is the third stormy day of the run.

Of the nine machines which reached Bath before the control was closed all but one were touring cars, and it is pretty evident that this type really enjoys a practical advantage over others in the traversing of hard roads for long distances. More credit is thus due to the light runabout

which came through successfully last night.

Of course it is the combination of man and machine which determines success or failure in this run. One should be ready to give full credit to the machines, but the operators of all the cars, whether successful or otherwise, and their observers ought to be entered on the roll of honor for a magnificent exhibition of Anglo-Saxon pluck and endurance. When trains are canceled, roads actually converted into rivers and all ordinary traffic suspended, it is magnificent to see these fellows sticking to the Pittsburg trail like bulldogs.

EFFECT ON THE PUBLIC.

One naturally wonders what effect the contest as thus far run will have on the public mind. If people at large could be intimately and personally aware as to what the road conditions have been thus far, the test would stand as a magnificent triumph for the automobile, but it is absolutely impossible to make people in easy chairs at home obtain any inkling of the difficulties which have been encountered. You can't describe a toothache to a man. He has to have one himself in order to appreciate it. And it is just so with regard to the road conditions that we have been through. People will never know from published accounts what this test has meant in regard to hardships imposed upon men and machines, and it is too much to hope they ever will.

Any machine which reached Binghamton is good enough for any man to own. If he is not satisfied with the performance of these autos, he is not a candidate for a road machine, but is looking for a gasoline launch. As one gentleman phrased it: "The trains are stalled, the wires are down, and nothing running but the rivers and the automobiles."

The average man will say, it is to be feared: "Here were thirty-odd machines starting out for a 794 mile run, and less than half of them accomplished one-third of the distance on the day the schedule called for, and quite a proportion of them did not accomplish it at all. Therefore, the test was a failure as indicative of adequate endurance on the part of the machines." Such a conclusion would be absolutely unjust and erroneous, for it is folly to draw any conclusions from the results of a test run during a fall freshet of more than usual severity.

PARTICULARLY SEVERE FOR AIR COOLERS.

Of the machines which did not reach Binghamton within the schedule not very much definite information is obtainable.

That one air cooled machine was damaged by fire, through a combination of a burst muffler and a leaky gasoline tank, is perhaps the most unfortunate incident which has thus far occurred. In fact, the air coolers have had a pretty hard time, with almost continuous low gear work and with mud plastered over their radiating surfaces. There have been some broken



ARRIVAL AT BINGHAMTON.

axles and one machine, of a make which has hitherto made splendid records, broke its engine apparently beyond repair. Machines are scattered all along the way between Pine Hill and Binghamton, in barns and in the small towns, and while quite a proportion of them will doubtless keep "plugging" along, although so much belated, there may be quite a number about which nothing more will be heard.

WHEELS AND TIRES.

The machines which have large driving wheels possess a certain advantage under existing weather conditions, as they bring the mechanism somewhat more out of the wet. The large tires probably cut into road surface somewhat less deeply than do the narrow ones.

The very low hung cars must some of them drag in the water very frequently. Unless a car is thoroughly waterproof as regards its ignition apparatus, clutches, and indeed all operating parts, it is booked for trouble of all kinds. Only cars of the highest power can expect to make any time as conditions now are.

It may well be imagined that the manufacturers who did not enter cars are rather glad than regretful of the fact, because it

is hardly likely that many of the manufacturers will really gain the laurels they deserve in the test, no matter how magnificently their cars may have performed under the almost impossible conditions which have prevailed up to now.

One is prone to inquire why endurance contests are held so

LATE IN THE SEASON,

when there is likelihood of cold weather and more than a normal rainfall. It would be far pleasanter for the men if the date had been set earlier in the season, when the weather is likely to be warmer, the days longer and the rainfall more nearly the average. Of course, a reasonable amount of rain is desirable as improving the conditions of average practice. Perhaps the manufacturers consider themselves too busy earlier in the season.

Quite a number of the belated cars—mostly runabouts—are reported as having left Binghamton at 1 p. m. today.

STRAIN ON TRANSMISSIONS.

One large touring car has stripped its low speed and intermediate gears, and it is remarkable that this does not happen oftener among the vehicles which have leather faced cone clutches without special



A HAYNES-APPERSON AT BINGHAMTON.

provision for gradual engagement. Without some such precaution the clutch engages almost instantaneously, and must strain the gear teeth to the limit.

One make of light runabout has been having considerable trouble from stripping its sprocket teeth. Cast iron is no proper material from which to make sprockets, as it has a very low transverse strength and the teeth are likely to break or shear off near the roots. Steel is the only material that is good enough for this purpose.

The slippery road conditions have given a good opportunity of studying the skidding effects produced by sudden brake applications. Operators have had to be very careful in this regard, especially when approaching severe down grades. As a rule, brakes which act directly upon the hubs of the rear wheels through an equalizing connection are the only safe ones to use, and the operators appear to employ their transmission and differential brakes very little, as their use involves a greater danger of the two wheels revolving at different rates and producing skidding.

The Arrow car has plodded through the disagreeable rain of today and over the slippery road with its usual reliability, and was among the very earliest into Buffalo, the city of its birth. The terrific water bars over which it has been driven have, however, proved too much for the front springs, both of which are in bad condition. Anyone who has ridden upon the car will not wonder at this, but will marvel that there is any of the running gear left at all.

The broken axles which have been reported thus far seem to have been the result of accidents and not to have broken in ordinary service from any structural defects. Indeed, most of the breakages of which I learn seem to have resulted from the extraordinary conditions of abuse to which the machines have been subjected and not from any inability to withstand legitimate conditions. This is a sign of splendid progress in the art.

ERIC, October 12.

This morning's start was the first one which seemed to have the approval of the weather authorities and it was indeed cheering to see the sun. Fifteen vehicles left the garage in Buffalo, a somewhat less number than had been confidently predicted by some of the officers.

On account of the necessity of replacing the two front springs and the desirability of changing the rear ones as well, our Arrow car was the very last to leave the station. There had been considerable repair work going on, among which was the substitution of a complete new rear axle upon one of the multi-cylinder air cooled cars. There cannot have been much trouble experienced on the road by the cars today or we should have been aware of it, as we were traveling in the rear of the procession. We passed nothing on the road except two

Oldsmobiles, which were traveling very nicely.

The roads today were by far the best we have found since leaving Pine Hill and admit of good speed, with comfort and safety. The Arrow has behaved in a perfectly exemplary manner today and the new springs improve its riding qualities greatly.

It is surprising to note what a change the good roads and good weather cause in the feelings of operators and observers. Pittsburg does not now seem so very far off and everyone's courage is of the best.

The Start from Buffalo.

Monday morning dawned with the sky clear and the sun shining for the first time since the autoists left Weehawken. Sunday had been a hazy, cloudy sort of a day, but there had not been any rain and the roads between Buffalo and Erie, Pa., were reported to be in excellent condition.

Everyone was up bright and early ready and eager for the start, and the camera men who had been following the run by team were particularly elated as the bad weather had practically made it impossible to get good photos.

The operators and observers were all at the Queen City garage before 7 o'clock, all being ready to start at that hour, the new rule issued preventing any contestants getting away before this time. Most of the machines had been overhauled and thoroughly oiled on Sunday, and were all in good shape for the start. It was impossible to tell the original color of any of them, so thickly was the mud caked on them, but the operators for the greater part were proud of this proof of the hard roads they had come over, and refused to let any of the mud be washed off. Persons at the places where cars stopped had marked their initials in the mud that caked the bodies, and this had hardened so that each car was fairly covered with initials and varied marks.

Toledo, No. 9, the four cylinder car which had experienced a rather stormy passage from Binghamton to Buffalo, was the first car to pull out of the garage and get in line for the start of the run to Erie. When the car was ready to start and the word had been given to go, Official Weigher Downs discovered that the 250 pounds of ballast required to be carried was missing, no doubt having been thrown away during the time the car was in trouble. It was necessary to secure new ballast or weight in some form, and after considerable skirmishing around a newspaper man was found who was willing to go in the machine as a passenger, and he having climbed in the start was made at 7:07 o'clock. The two Toledos had replaced their chains with new ones, the side chains, being exposed, caught all the mud and were badly worn as a consequence.

White No. 5 was next in line, and was started at 7:07:30. This car and the other White entries seemed to be suffering from weak rear springs, and had utilized old

inner tubes to prevent the springs from bending too far and snapping off.

Stearns No. 35 was third off, being started at 7:07:45. During Sunday a new shoe had been put on the right rear wheel. The chains on the left rear tire to give it a grip in the mud were still on when the car started for Erie.

No. 15, Pierce, got away at 7:08, carrying a can of 5 gallons of gasoline along for some reason or other. Toledo No. 10 was started at 7:08:30 and went off a few feet, when the motor started skipping spark and threatened to stop. The operator worried along, slipping his clutch for half a block or more, and finally got the motor running regularly again. It was evidently a case of too rich a mixture.

Columbia No. 2, which met with a disastrous accident in breaking its axle by skidding into the gutter while coming into Buffalo on Saturday night, was next started. This car had also been fitted with new side driving chains. The left rear wheel was noticed to be wobbly and out of true as the car started off down the street at 7:15 o'clock.

The other starters went off as follows without incident: White, No. 6, at 7:15:30; Rambler, 18, 7:23; Haynes-Apperson, 30, at 7:31:30; Old Pacific, 16, at 7:32:30; Oldsmobile, 41, at 7:39; Franklin, 25, at 8; Oldsmobile, 39, at 8:19; Franklin, 27, at 8:32, and Pierce Arrow, 14, at 9:15. The pilot cars left an hour before this time to sprinkle the road with confetti.

After all had started the following official report was issued by Press Agent Tucker:

"The St. Louis car is at Corning, N. Y. It is awaiting new tires and will drive with relay to catch the rest at Cleveland.

"It is reported that Riker No. 36 started from Campbell at 6 a. m. today (Monday).

"No. 25, Knox, is at Binghamton. It will drive with relays of operators from today on."

The fact that the cars delayed by troubles and road conditions were going to drive by relays gave a new interest to the run. It is likely that some good time will be made en route.

The Fifth Day's Run

The roads were reported to be in satisfactory condition, and this run proved to be the most enjoyable since the start. The weather was clear, the sun shining brightly, and the operators, mechanics and passengers enjoyed the run every moment. Some stops were made under the head of lunch time to pick grapes from the numerous vineyards bordering on the road. Not a single case of trouble was reported in any machine on the entire route, and, as Operator Percy Pierce remarked, "The road was too easy for anyone to have trouble on. After what we have gone through it seemed like a parlor floor. I would have been ashamed of any motor that would have kicked up under such easy sailing."

The Erie pilot car, being run by Operator Nickerson, arrived at Erie at 10:50 a. m., and drove over the route along State street, his passengers distributing confetti as usual to mark the route, when he was stopped by a policeman who ran out in the road and announced that those in the car had violated a city ordinance relative to the throwing of waste paper around the streets of the city and were under arrest. Despite their protests and explanations they were obliged to drive over to police headquarters, the officer who had made the arrest stating without hesitation that he was acting under special and direct orders from Mayor William Hardwick. It seems that the Erie automobilists and the mayor are at odds over some question or other, and his honor had planned this arrest.

Nickerson and his party were taken before Chief of Police Sullivan, who, after explaining the law to them and forbidding the further distribution of confetti, allowed them to go. The Erie autoists were indignant over the action of the authorities, which was so different from that accorded the automobilists in other towns, and there was some talk of an indignation meeting. The courteous treatment of the farmers in the country, where the greatest prejudice is supposed to exist against autos, was in great contrast to the rather petty action of the Erie officials.

The White pilot car arrived at Erie at 12:07. The first contesting car in was the Stearns, No. 35, which arrived at 12:03, having made the run of 95¼ miles in 4 hours and 55 minutes. Mr. Stearns had not rushed things at all, he said, and remarked that he believed he could cover the same course in three hours if he wanted to.

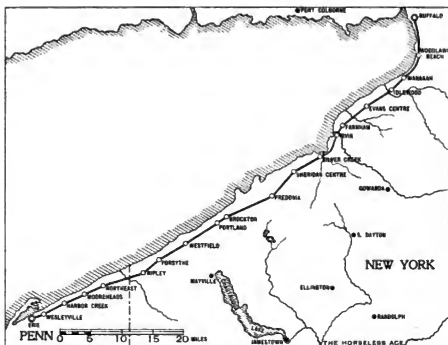
The other cars finished as follows: No. 5, White, 12:07; 2, Columbus, 12:16; 9, Toledo, 12:16:30; 18, Rambler, 12:32; 6, White, 12:33; 10, Toledo, 1:19; 15, Pierce, 1:22; 30, Haynes-Apperson, 1:39; 27, Franklin, 1:53; 16, "Old Pacific," 2:26; 26, Franklin, 2:39; 14, Pierce "Arrow," 3:30; 41, Oldsmobile, 4:00; 39, Oldsmobile, at 4:01.

These two last arrivals completed the list of starters from Buffalo and the cars yet to be heard from were those still missing at the Queen City.

At Erie.

The automobilists, after having dined at the Reed House, were invited to attend a session of the Chamber of Commerce in a body. The meeting was called to order at 8:30 o'clock, and letters of regret were read from several speakers invited, among them Joseph Beach Hunter, of the Pennsylvania State Highway Commission, and Mr. J. J. Carter, head of the good roads department of the U. S. Department of Agriculture at Washington, D. C.

In response to telegraph messages sent out today word was received at the Reed House that the road conditions between Erie and Cleveland were good. The Pack-



FIFTH DAY'S ROUTE.

ard Motor Car Company wired from Detroit, Mich., that there had been a little rain around Warren, Ohio, but that the roads were rapidly drying and the cars

would be able to get through without difficulty.

The following official list gives the positions as far as known of all the cars still in

TABLE OF STARTS AND ARRIVALS

No.	NAME OF CAR.	Left Weehawken	Arrived Pine Hill	Left Pine Hill	Arrived Binghamton	Left Binghamton	Arrived Bath	Left Bath	Arrived Buffalo	Left Buffalo	Arrived Erie	Left Erie
2	Columbia	4	1	11	6	12	1	7	9	6	3	4
3	Columbia	6	22	..	..	..	..	..	..	..	..	..
4	White	3	17	23	10	7	..	..	..	..	..	..
5	White	8	30	22	1	3	4	5	1	2	2	2
6	White	11	17	..	5	6	..	6	4	1	6	6
9	Toledo	12	4	4	4	4	7	3	6	5	7	9
10	Toledo	12	4	4	4	4	7	3	6	5	7	9
13	Phelps	18	8	8	..	..	..	..	..	9	9	..
14	Pierce Arrow	1	9	9	3	8	3	2	3	15	13	10
15	Pierce	2	1	1	13	2	8	1	2	4	8	5
16	Packard ("Old Pacific")	9	3	3	11	9	6	9	5	10	11	3
17	Rambler	10	6	6	..	..	..	..	..	..	..	..
18	Rambler	22	7	7	12	5	9	8	8	5	5	7
19	Fredonia	..	..	..	..	..	..	..	..	..	..	..
20	Fredonia	14	..	..	..	..	..	..	..	..	..	..
23	Knox	15	26	25	..	..	..	..	..	..	..	17
24	Knox	16	11	13	..	..	..	..	..	..	..	18
25	Knox	17	10	15	..	..	..	..	..	..	..	..
26	Franklin	29	17	16	..	..	..	..	15	12	12	14
27	Franklin	28	9	..	..	..	..	..	13	14	10	11
28	Franklin	30	26	24	..	..	..	..	..	..	..	..
29	Haynes-Apperson	23	6	10	..	..	..	..	..	..	..	..
30	Haynes-Apperson	24	20	19	15	13	..	..	14	9	9	15
31	Haynes-Apperson	25	27	..	..	..	..	..	..	..	..	..
32	Northern	27	25	..	..	..	..	..	..	..	..	..
33	Northern	26	20	21	16	17	..	..	..	..	..	..
34	Northern	21	5	18	..	..	..	..	..	..	..	..
35	Stearns	30	3	14	7	1	2	5	7	3	1	1
36	Locomobile	5	13	20	9	15	..	..	..	..	..	16
37	Holley	..	..	..	..	..	..	..	..	..	..	..
39	Oldsmobile	13	15	2	14	16	..	..	12	13	15	13
40	Oldsmobile	14	14	5	2	14	..	..	..	..	..	..
41	Oldsmobile	19	28	..	17	11	..	..	11	11	14	12
42	St. Louis	32	19	17	..	..	..	..	..	..	..	..
	Total number of arrivals.....	34	33	33	17	17	9	9	15	15	15	18

The figures in this table show the order of start and arrival of the respective cars.

the run up to 9 p. m. on Monday, October 12:

In garage at Erie: No. 2, Columbia; 5, White; 6, White; 9, Toledo; 10, Toledo; 14, Pierce; 16, Packard; 18, Rambler; 26, Franklin; 27, Franklin; 30, Haines Apperson; 39, Oldsmobile; 41, Oldsmobile, and 35, Stearns. Further particulars were learned of the following machines which were still behind: Nos. 23 and 24, Knox, arrived at Buffalo at 7 p. m., Monday, ready to proceed to Cleveland early Tuesday. Observer of No. 25, Knox, 'phoned from Batavia, Monday, 7 p. m., that they would arrive at Buffalo Monday night. No. 36, Locomobile, left Buffalo for Erie at 5:30 p. m. Monday.

It was officially announced Monday night that the brake and hill climbing contests in Pittsburgh had been abandoned. Also that the examination for competitive points would not take place as first planned. In its stead there will be an examination by the board of examiners and a report on the condition of the cars at the close of the run.

The reason for the abandonment of the competitive report is because so many of the cars have been unable to get to the garages owing to the unexpected conditions and are still continuing, although really out of the run. The officials think the cars that do finish are entitled to an examination and that the operators who have come along so gamely should also be given a chance.

Sixth Day's Run.

When the start was made from Erie on Tuesday morning the weather was good, and the distance of 82 miles to Cleveland presented comparatively few difficulties. Nos. 23 and 24, Knox, had reached Erie after an all night drive. No. 36, Locomobile, driven by A. L. Riker, had arrived at Erie at midnight. No. 17, Rambler, was reported at Buffalo and starting from there with the intention of driving all night. Following is a list of the starters from Erie:

No. 35, Stearns, 7 o'clock a. m.; 5, White,

7:00; 6, White, 7:05; 2, Columbia, 7:02; 9, Toledo, 7:06; 18, Rambler, 7:05; 10, Toledo, 7:09; 26, Franklin, 7:11; 27, Franklin, 7:15; 41, Oldsmobile, 7:17; 39, Oldsmobile, 7:17; 14, "Arrow," 7:10; 15, Pierce, 7:02; 30, Haynes-Apperson, 7:34; 16, Packard, 7:00; 36, Locomobile, 9:45; 23, Knox, 9:50; 24, Knox, 10:00.

No. 36, Locomobile, was delayed by stripping the reverse gear, and reached Cleveland at 10:30 p. m. No. 24, Knox, was delayed at Painesville owing to the roller bearing in a front wheel being ground to pieces, and necessitating another being sent for. No. 42, St. Louis, left Erie at 3:20 p. m. to catch up with the procession, having run night and day. "Old Pacific" broke a steering knuckle 10 miles east of Cleveland and bent an axle and radius rods by dropping into a deep hole. The damage was repaired and the car got into the garage, which is open to the public this evening.

Stearns, who started first, set up a lively pace and ran into Willoughby, the last town before Cleveland, at 10:13. There he made a stop of forty-five minutes, by which time No. 5, White, driven by Webb Jay, had arrived. The two then drove into Cleveland together, and pulled up at the garage at five minutes to noon. No. 2, Columbia, was delayed with tire troubles at Ashtabula.

The following is the order of arrival at Cleveland:

No. 35, Stearns, 11:55; 5, White, 11:55; 6, White, 12:06; 2, Columbia, 12:32; 9, Toledo, 12:37; 18, Rambler, 10:18; 10, Toledo, 2:05; 26, Franklin, 2:24; 27, Franklin, 2:33; 41, Olds, 3:33; 39, Olds, 3:35; 14, Arrow, 5:05; 15, Pierce, 5:17; 30, Haynes-Apperson, 6:30; 16, Packard, 7:33; 23, Knox, 5:17; 36, Locomobile, 10:30.

The Society of Motor Manufacturers and Traders, Ltd., Automobile Show for 1904 will be held at the Crystal Palace from February 12 to 24 next. Already the names of 152 exhibitors figure upon the list, it is said, and no less than fifty firms have sent a bond in to exhibit.

The American Cars in the British Reliability Trials.

Among the 104 cars which started in the British Reliability Trials were seven American cars—a Stanley steamer, two Oldsmobiles, a Cadillac, a Winton and two Whites. Of these, six got through, a proportion considerably greater than the total proportion of finishing cars to starters (76 to 104). This showing is particularly satisfactory when it is considered that most of the American automobiles were light, low priced cars.

According to an unofficial report in the *Automotor Journal*, one of the Whites made seven non-stop runs and one run with stops amounting to less than five minutes; the other White, four non-stop runs, three runs with stops under five minutes and one run with stops over five minutes; the Cadillac, five non-stop runs, one with stops under five minutes, one with stops over five minutes and one run on which an accident occurred which was not chargeable either to the car or its driver is to be rerun; one of the Oldsmobiles made two non-stop runs, two runs with stops under five minutes and four with stops over five minutes; the other Oldsmobile, two non-stop runs, four runs with stops under five minutes and two with stops over five minutes. The Stanley steamer made one non-stop run, two runs with stops under five minutes and five runs with stops over five minutes. The Winton made one non-stop run, one run with stops under five minutes and two with stops over five minutes. Owing to breaking its crank shaft on the third day it was disqualified and retired.

Another evidence of the relatively good aggregate showing of the American cars is the fact that of a total of thirty-three cars which made at least five non-stop runs, three were American, or one in eleven, while of the total number of starters only one in fifteen was American.

The Bury Hill, which is 3,060 feet long and has an average gradient of 8.5 per cent, and a maximum of slightly over 9 per cent., was climbed at the following



EIGHTEEN HORSE POWER JAMES & BROWN.



ENGLISH RELIABILITY TRIALS.

THIRTEEN HORSE POWER REL.

average speeds by the American cars: White, 13.63 miles per hour; White, 10.15; Winton, 9.85; Cadillac, 7.87; Oldsmobile, 7.58; Oldsmobile, 7.17; Stanley, 5.50.

The speeds on the Westerham Hill, 3,288 feet long, with an average gradient of 9.84 per cent. and a maximum of 12.5 per cent., were as follows: White, 9.47 miles per hour; White, 8.50; Oldsmobile, 7.55; Oldsmobile, 5.37; Stanley, 0.95.

The Hindhead Hill, which is 2 miles long and has an average grade of slightly over 4 per cent., was climbed at the following speeds: White, 22.78 miles per hour; Stanley, 15.37; White, 15.2; Oldsmobile, 13.45; Cadillac, 11.1; Oldsmobile, 10.50.

Following are the results of the speed trials at Bexhill-on-the-Sea: White, 33.58 miles per hour; Stanley, 32.14; White, 30.12; Cadillac, 28.75; Oldsmobile, 27.77; Oldsmobile, 24.85. The cars ran in these trials with full equipment and full complement of passengers.

Independent Manufacturers Organize.

The Independent Automobile Association of America, whose organization in opposition to the Licensed Association was reported in our last issue, has opened an office in Room 1005, Flairion Building, Twenty-third street and Fifth avenue, New York, and announces that it will begin an active propaganda among automobile manufacturers outside the pale. An officer of the association states that pledges have been quietly secured from about sixty makers and dealers, and that a membership of July 200 is counted on within ninety days. The policy of the association, we are informed, will be to force the Licensed Association to sue under the Selden patent. A document is being prepared for publication.

Through a misprint in our last issue the annual dues were given as \$2,500, when it should have read \$25 a quarter.

Trade Literature Received.

The Standard Welding Company, Cleveland, Ohio.—Catalogue of the company's seamless steel rims, seamless steel tubes, tubular steel bottles and bicycles and miscellaneous parts in the manufacture of which electric welding is employed.

Long Manufacturing Company, corner La Salle avenue and Michigan street, Chicago, Ill.—Catalogue of spiral radiator tubing and complete radiators.

Only two proposals have been received in the competition of offers for the construction of motor garbage wagons instituted by the city of Paris. M. Guillemant offers to furnish a wagon on the Megy system, capable of transporting three tons and attaining a speed of 10 miles per hour. Price, \$4,900. M. Biancheri offers a vehicle of 12 h. p. capable of transporting 7,500 pounds total weight, wagon included, at a speed of 7½ miles per hour.

COMMUNICATIONS.

Auxiliary Exhaust in Air Cooled Engines.

Editor HORSELESS AGE:

Please advise me through your communication columns if any air cooled automobile engines have the auxiliary exhaust which is opened by the piston when in its extreme outward position. If there are none so equipped, what is the reason? The auxiliary exhaust certainly gives superior cooling results.

P. W. K.

[Air cooled motors do not have the auxiliary exhaust, at least none of those with which we are familiar. The auxiliary would tend to keep the engine cooler, but introduces difficulties in the way of cylinder lubrication, as it causes the oil on one side of the cylinder wall to blow out with the exhaust. As the lubrication of an air cooled engine is a difficult problem in any case, this is probably the reason the auxiliary exhaust is not used. There are two additional disadvantageous features in connection with this form of exhaust, however—it reduces the effective length of stroke and tends to cut the piston rings.—Ed.]

Accidental Reversal of Steam Engines.

Editor HORSELESS AGE:

Since reading in THE HORSELESS AGE of September 30 your explanation of accidental reversing of steam engines I have been experimenting on my own carriage. I brought the front wheels against the side of the barn and slipped the rear wheels by hand to get the links in the proper position for the pressure of the valve stems to act to best advantage, and then by admitting steam either slowly or suddenly I have been unable to make any impression on the links. In fact, there was no evidence of any force tending to push out the valve stems. Was it because the packing was too tight or because the resistance due to the increased friction of the valve was superior to the pressure on the section of valve stems? I am unable to say. Every time I let the machine coast with the engine reversed I am sure the reverse lever will work itself in the forward position. A similar thing will occur if I let the machine run backward; the engine will reverse. This tendency of the links to follow the rotation of the engine shaft is more marked when the link blocks are a little worn.

While it is evident that a reverse that is locked on a sector is superior to the reverse in use in old style machines, it must also be admitted that it is too slow to manipulate in case of emergency.

In my opinion the best system of reversing is the one in which the links are kept

in the forward position by a strong spring, and the reverse is actuated by a pedal. I feel confident that the few accidents I have had would have been avoided if my machine had been equipped with a reversing mechanism of that kind.

ERNST DUVAL, M. D.

[When a machine accidentally reverses under the conditions stated it is undoubtedly due to the friction on the eccentrics.—Ed.]

Cushion Tires.

Editor HORSELESS AGE:

I notice in your issue of October 7 M. L. F. wants to know about cushion tires I have been using a pair on my drive wheels for two months, and would not think of exchanging for pneumatic. I have a peace of mind that cannot be had with any other.

H. BOLEY.

Editor HORSELESS AGE:

Replying to query in THE HORSELESS AGE of October 14. I have been using Benoca tires on the front wheels of an Oldsmobile since last March. They are not quite so easy riding as pneumatics, but I have been so well pleased with them that I recently changed my rear tires to the same.

After a comparatively limited experience I am of the opinion that some form of cushion tire will satisfactorily replace pneumatics in the lighter class of vehicles without damage to the vehicles and with reasonable comfort for passengers.

With me flat tires have been a too frequent source of annoyance and loss of time.

F. D. PORTER.

Editor HORSELESS AGE:

My experience with non-puncturable tires has been with two 36x3 inch Latina cellular tires. They cost me \$70 and ran just 54 cyclometer miles, when they were absolutely ruined. The lugs came out and the tires came to pieces. They were good for silencing the noise of the wheels, were extremely heavy, were exactly the same as solid tires as far as resiliency is concerned, and certainly my experience has been very unsatisfactory.

R. P. GOODE.

Anti-Freeze Solution.

Editor HORSELESS AGE:

As a subscriber to THE HORSELESS AGE, will you kindly inform me what in your opinion is the best formula for an anti-freeze solution for a gasoline wagon? I am under the impression that some time ago in one of your issues you gave a formula, but am unable to locate that issue.

F. A. MABBETT.

[A solution of calcium chloride is generally used, five pounds of the chloride to a gallon of water. A handful of lime may be added to neutralize any free acid and prevent corrosion.—Ed.]

Heat Resisting Paint.

Editor HORSELESS AGE:

In THE HORSELESS AGE of September 23 I read an interesting article on the subject of cooling motors, and the superior efficiency of lampblack as a radiating coating. I have an air cooled motor which overheats, particularly at the admission and exhaust valves, the two being close together. The motor at this point gets red hot. I tried lampblack, but as soon as the motor became hot the oil in the lampblack melted and the entire coating disappeared, leaving the motor as clean as if just washed. I next tried stove enamel or blacking. I do not know the composition of this, but it disappeared in an hour's ride.

Since it is acknowledged that lampblack is a fine radiator, I would be glad to know how this or any similar substance can be kept on a motor like this, especially at this most vulnerable point. A.

[Following are two formulae for paints which are claimed to withstand high temperatures. Both of these paints are of black color. The first requires the following ingredients: Three pounds lampblack, three pounds graphite, one pound black oxide of manganese, one pint japan gold size, half pint turpentine and one pint boiled linseed oil. Powder the graphite and mix all the ingredients well together to a uniform consistency. Then apply two coats as with ordinary paints. The ingredients for the other paint are: Two pounds of black oxide of manganese, three pounds of graphite and nine pounds of terra alba. Mix well together and pass through a fine sieve; then mix to the required consistency with the following preparation: Ten parts silicate of soda, one part glucose and four parts of water.

These paints we find recommended for "boiler chimneys, smoke boxes and cylinders' ends." It is rather questionable, however, whether they would stick to parts which actually become red hot.—Ed.]

An automobile ordinance was recently passed in South Bend, Ind. Owners must pay a registration or license fee of \$5 for each machine they own, and the license number must be carried on the back of the vehicle. The speed is limited to 8 miles an hour within and 15 miles per hour without the fire limits. The ordinance provides for the placing of an effective alarm approved by the clerk upon all automobiles and also for the placing of lights upon them for a period covering one hour after sunset to one hour before sunrise of each day. Permits are not transferable. Any person violating the ordinance will be subject to a fine not to exceed \$100 and not less than \$25, to which may be added imprisonment not to exceed thirty days. The speed limits, it will be observed, are quite reasonable, and we are informed by a correspondent that they were raised considerably after the ordinance was first introduced.



S. K. Dingle will shortly establish in Boston an experimental plant for the development of new ideas in the automobile industry.

Lyman & Burnham, Boston, Mass., are building two 30 horse power experimental cars driven by four cylinder (4½ x 6) horizontal engines.

Banker Brothers Company, Philadelphia, report sales of Autocars to Philip H. Johnson and John W. Henderson, both of Philadelphia.

C. W. Gray, president of the Chicago Automobile Club, is endeavoring to lower the Chicago-New York record with a 16 horse power Peerless.

The Massachusetts Highway Commission is making a tour of inspection of the roads of the State in two automobiles, one of French, the other of American make.

The Boston Automobile Exchange expects to build during the winter in the Back Bay district the largest garage in the city for the accommodation of all styles of automobiles.

On Tuesday, the 13th, W. E. Eldridge, agent for the Toledo gasoline cars at Boston, Mass., made an onslaught on the record at Commonwealth Hill, where the official hill climbing trials were held last April.

We are informed that since the Sta-Rite spark plug was brought out last winter nearly 1,000 separate orders have been received for it, and 37,000 porcelains have been ordered by the manufacturers, the Detroit Motor Works.

The Toledo Storage Battery and Electrical Company has been organized at Toledo, Ohio, to manufacture a storage battery invented by George J. Miller. Mark Griffin is president, L. A. Alexander vice president, J. T. Green treasurer, Charles R. Clapp secretary, and George J. Miller general manager.

Hotel and business men of the White Mountain district held a meeting recently at Littleton, N. H., and organized the White Mountain Board of Trade, and among business transacted passed the following resolution: "Resolved, That it is the opinion of the White Mountain Board of Trade that the coming into the mountains of automobiles from all parts of the country should be encouraged."

We have received a copy of the first issue of "The White Bulletin," a little pamphlet to be issued from time to time by the White Sewing Machine Company, of Cleveland, Ohio, in the interest of the White steam touring car. The first number describes the tour of the Dill party from New York to Maine, the race track feats of the two special White racers and

tours from Albany to Cleveland and from Buffalo to New York made by other owners of White cars.

Over twenty French automobile manufacturers have applied for space at the St. Louis Exposition.

The Ohio Valley Automobile Club has been organized at Wheeling, W. Va., with about twenty-five members.

The assets of the bankrupt National Automobile and Motor Company, Milwaukee, Wis., have been appraised at \$2,087.82.

The Automobile Club of Kansas City has been advised by its attorney that it is not a proper subject of incorporation under the State law.

The E. R. Thomas Motor Company, Buffalo, N. Y., report that they entered two of their 1904 models in the Endurance Run, but were unable to complete them in time.

It is reported that the Mohawk Cycle Company, Indianapolis, Ind., and the Standard Wheel Company, Terre Haute, Ind., have decided to abandon the auto business.

The entire building Nos. 230 and 232 West Thirteenth street, New York, has been leased by Panhard & Levasseur, Paris, France, who will open a branch for the sale of their automobile and motor boats.

A. Chaney has retired from the management of the Chaney Automobile Company, Terre Haute, Ind., and the name of the concern has been changed to the Terre Haute Automobile Company, John S. Cox manager.

The Mosely & Motley Milling Company, Rochester, N. Y., have just put in commission a 4 ton electric truck for hauling flour, and Burke, Fitzsimmons, Hone & Co., same city, have secured a three-quarter ton electric delivery wagon.

Barclay H. Warburton has been appointed receiver for the Searchmont Automobile Company, Trainer, Pa. The directors are working on a reorganization plan under which the present bondholders will allow another mortgage to be executed, taking precedence over theirs and allowing the directors to raise more working capital.

At the annual election of the Buffalo Automobile Club on October 12 the following ticket was successful: President, William H. Hotchkiss; vice president, August H. Knoll; secretary, F. J. Wagner; treasurer, Charles Clifton; governors, Edward H. Butler, H. A. Meldrum and E. R. Thomas.

I. S. Smith is exhibiting at Haberer & Graham's machine shop, South Bend, Ind., a new type of flash boiler, on which patent has been applied for. The boiler is 24 inches in diameter and 14 inches high, is rated at 15 horse power and said to have 35 square feet of heating surface. We fear the rating is rather high, for the best of flash boilers on the market give only 1 horse power per 5 square feet of heating surface.

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Reflections on the Endurance Run.

When comparing the three successive annual endurance contests held in this country one cannot help reaching the conclusion that weather conditions have always been unfavorable to best results. In 1901 the route to Buffalo was an inherently difficult one, and the consensus of opinion was that with the continual rain the contest had been too severe and too much of a strain on the operators. This opinion was reflected by President Shattuck, of the A. C. A., when in a discussion on a proposed endurance run he said: "I suppose no one wants to go to Buffalo again." The New York-Boston and return contest in 1902, on the other hand, proved very easy, the roads being good nearly all the way and the weather fair throughout the run. In this contest a reasonable amount of bad weather would really have been desirable. This year's run has in many respects been a repetition of the 1901 event, but the aggregate showing made has certainly been very much better.

Owing to the unforeseen difficulties the organization broke down almost completely. It had been the intention not to make public the times of start and arrival, but apparently pressure was brought to bear on the management, and after the first day all the times were given to the press representatives. As there were only two or three among the contestants who seemed to be bent on speeding, and as the reporters would have gotten their times in any case, there was no great objection to this change in the rules.

As observers frequently deserted their cars, it was evidently quite impossible to get an accurate record of all stops made, and this led to the abandonment of the idea of giving marks for reliability, as provided for in the rules. The reasons given in the official statement for the abandonment of the brake and hill tests in Pittsburgh are not very clear, but it can easily

be imagined that all the drivers who succeeded in reaching the terminus of the great run were so tired out that they longed for nothing more than to get back home. It would appear a better plan in future contests to hold such auxiliary trials as hill climbing and brake trials before the long run. They do not tire out the drivers and make them unfit for the chief struggle, while little interest in these trials can be expected from operators worn out by the strain of an 800 to 1,000 miles drive under contest conditions. The cleanly and proper appearance of the vehicles before the run would also make a better impression with the people who might be expected to attend such trials if held in or near a large city.

After a car has successfully made a trip equivalent to that from New York City to Pittsburg, especially under weather conditions as they existed in this contest, there is little or no need of special hill climbing or brake tests, as a car that will safely surmount all the hills met in this route will satisfactorily meet any touring conditions. This, however, is no reason why such trials should not be held, as they afford interesting demonstrations and form an object lesson to the general public of the essential qualities of the automobile.

We have repeatedly pointed out in these columns that it is almost impossible to foretell the difficulties that will be met in endurance contests in this country, owing to the influence of the weather on the condition of the roads. After the experience of the three contests it seems to us that in the future contests should be held on roads which are not made impassable by heavy rains, roads like those between New York and Boston. Five to six days' trips of 130 to 150 miles each, on such roads, with rigid observance and detailed reports, would be more valuable than the contest just concluded. It is true, as often observed, that there is comparatively little need of further endurance trials for cars which have been

in all or nearly all tests during the last three years, but the industry has need of some form of demonstration on a sufficiently large scale to impress the public—propaganda runs, as the Germans say. It will have been noted that manufacturers who were successful in former runs do not rest on their laurels, but continue to enter, a proof that they consider these runs most effective demonstrations.

The Healthfulness of Automobiling.

Attention has repeatedly been called to the beneficial influences of automobile riding in cases of certain diseases. These beneficial effects are principally the result of two causes—the breathing of fresh and pure air and the continual slight vibration of the car. In addition, automobiling is an efficacious antidote to the effects of hot weather, and the discomfort ordinarily felt when the thermometer is above 90 degrees is not perceptible when riding in an automobile at a fairly brisk pace, owing to the draft created by the motion of the car.

An automobile trip taken under proper conditions is also very restful to the nerves, and constitutes therefore a very desirable form of recreation for those occupied in exhausting mental work. It need hardly be said that in order to fully enjoy the rest giving qualities of an auto ride one must not drive himself, but simply occupy a seat in the car. It is known that restricted railroad travel has something of this same effect, but not nearly to the same degree as automobile travel, as in the case of the latter the change of scene does not take place rapidly enough to confuse the mind, but occupies it just enough to banish business cares, etc.

Automobile rides have been recommended by eminent medical authorities as a cure for nervousness. Nervous persons should, of course, not drive themselves, and the speed should be kept moderate, as high speeds are a strain on the nerves of both driver and passenger. At excessively high speeds some of the other good effects of automobiling are also lost, notably that due to the draft, as a very strong draft is likely to be injurious to health.

In general an automobile ride at normal speed on fair roads and in good weather has a refreshing and exhilarating influence and has been observed to restore interest in life in despondent people. The effect on normal and healthy persons is often that of rejuvenation of spirits, and automobiling is about the only form of enlivening the

spirits known which is not followed by reaction.

Hospital authorities in London have set the seal of their approval upon automobiling as a health restoring recreation by accepting the use of cars of private owners for the purpose of taking convalescents out to ride.

"Beyond Control."

A reader sends us a newspaper clipping describing an accident the cause of which is laid to the machine having gotten beyond the control of the driver, and says: "I am reasonably familiar with automobiles, and do not understand how, with ordinary prudence, these accidents can occur."

There is little doubt that in most cases, when accidents are reported as due to the machine having gotten beyond control, ordinary prudence was not observed. It must, of course, be remembered that the term "beyond control" is very comprehensive, and is used apparently by all newspaper men in all cases where it is impossible to get a definite explanation of the cause of the accident. The reason accidents under this head do occur rather frequently is that there are too many reckless drivers. Unknown or dangerous roads are traveled at a high speed, and when some sudden danger looms up, such as a sharp turn or a sandy or slippery stretch of road, the speed cannot be slackened sufficiently before the danger point is reached. The only cause of a machine getting beyond control for which the driver is clearly not responsible is a failure of the steering gear, and this accident is, on the whole, very rare. The accidents reported as due to the machine getting beyond control are mostly cases of skidding on slippery roads or slewing owing to taking sharp turns at too high speed. With ordinary prudence such accidents are not likely to occur, although even the most careful operator will at times be unable to prevent a skid.

When traveling at a very high speed a driver, particularly one who is not possessed of very steady nerves, may lose control momentarily and thereby cause an accident. A small involuntary movement of the steering wheel when a car is traveling at 40 to 50 miles per hour will land it in the ditch in the fraction of a second. One fatal accident which has been given very wide publicity is thought to have been caused by the operator being seized with a severe coughing fit while driving at very

high speed. During the recent endurance run an operator, in making an effort to throw out a large can of calcium carbide, which had become water-soaked and was generating gas rapidly, made a false move on the steering lever, and in consequence ran into a deep gully.

The Triumph of the Jump Spark.

The data of the sundries in the recent Endurance Contest furnishes conclusive proof that the jump spark is constantly gaining ground at the expense of the primary make and break spark. Of the thirty-nine gasoline cars entered in the contest only three were fitted with contact sparkers, and of those that started only two.

There is no better evidence of the superiority of one of two alternatives, in their actual state of development, than its adoption by a growing number of manufacturers, and one cannot help reaching the conclusion therefore that, all things considered, the jump spark system is at present preferable. During the last two years great advances have been made in all parts of the jump spark outfit, and the prices of these parts have fallen materially. Improvement has been particularly pronounced in the insulation of the stranded cables used for connections, and in the methods of installing these connections. Besides, the spark plug porcelains are now more durable, and the plugs less liable to become sooted. The interrupters are generally quite well enclosed, and the vibrator is located on the coil on the dashboard or in some other accessible place, instead of on the engine.

The rapid improvement in jump spark ignition is largely due to the fact that a special industry has sprung up for the manufacture of coils, plugs, commutators, etc., and each part has received thorough study and progressively been deprived of its weak points. The subject of heavily insulated stranded cables for wiring automobile engines has also recently received the attention of some of the larger insulated wire and cable manufacturers in this country, which accounts for the progress in this direction.

Calendar of Automobile Dates.

- October 22 and 23—Automobile Races of Macon Fair Association, Macon, Ga.
- October 31—Brighton Beach, New York. Race Meet.
- December 10 to 25—Paris Automobile Exhibition.
- January 15 to 23—Madison Square Garden Automobile Show.

N. A. A. M.'S ENDURANCE RUN, NEW YORK TO PITTSBURG.

The Start from Erie.

The start Tuesday morning from Cleveland was made from the stable used as a garage, at Tenth and Peach streets, promptly at 7 o'clock. There had been no repairs of any account made since arriving as near as could be learned. The first machine to get off on the run toward Cleveland was No. 35, Stearns, which left exactly at 7 o'clock, the operator, Mr. Stearns, evidently being intent on reaching his home town first.

The pilot cars, contrary to their usual custom, started for Cleveland on Monday night, evidently deciding to run ahead and wait outside the city for the contestants. The so called press car that is following the run reached Erie late Monday night, and was ready to start out again on Tuesday after a few small repairs and adjustments.

Howard M. Davis, operator of No. 23, Knox, who had been out on the road with his car for two days and two nights, reached Buffalo early Monday, where he was relieved by Operator Martin, who was sent on from the factory. Operator Pennington relieved Frank Fowler on No. 25, Knox, but J. E. Cowan, operator of No. 24, Knox, insisted on continuing through to Erie, despite the fact that he had not been to bed in two nights. The Knox trio had experienced hard luck and plenty of it. Mr. Davis came to Erie by train, and in speaking of his experiences said that during the heavy rains in the early part of the run he was delayed considerably by the water from the roads splashing up on his spark plug and causing short circuits. He also experienced considerable tire trouble, blowing up a shoe. When he managed to get another he found that he didn't have a foot pump, having lost his on the first day out. He was tied up all night as a result of this, and since then had been plugging steadily to catch up with the crowd.

He reported that Fowler, while on the road from Binghamton to Bath, met with a rather serious accident that came very near to terminating fatally. He was running along in the rain and mud when suddenly the car dropped into a deep water filled hole in the road. The water splashed up, covering a pound can of carbide that was on the floor. The carbide at once sized up, scorching the woodwork on the car. Fowler endeavored to reach the can, and in doing so the steering gear was knocked out of his hand, and the machine turned suddenly into the side of the road and plunged into a gully 5 feet or more deep and completely filled with water.

Mr. Wright, of the Knox Company, was sitting on the front seat with Mr. Fowler, and both of them were wet clear through. The water covered the front seats of the car and only the tonneau was out. A team of horses was secured and the car was dragged back on the road. The crank case was filled with water, and it was a big job

to get all this out and fix the spark plug and wire connections so that the engine would run again. They finally succeeded in doing so and continued.

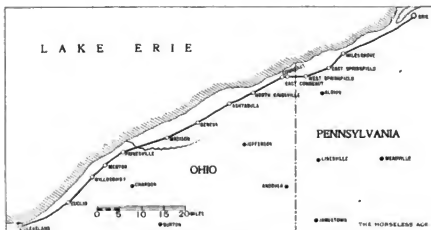
It was 7:53 when the first Knox car reached Erie. It was No. 23, and the operator had driven all night. His motor was rather hot, owing to the fact that it had been impossible to secure the proper sort of cylinder oil. A shipment of oil for the Knox cars had gone astray on the road to Buffalo, and as a result they were all in a bad way. This machine still had the lamps lit as it pulled into the garage. The operator and the observer were given a warm reception by the contestants gathered there.

At 7:57 Operator Cowan reached the garage in Knox No. 24. He had been wandering around Erie for half an hour or more trying to locate the garage. The poor fellow had not been to bed since Sat-

On No. 14, Pierce Arrow Car.

This morning's start from Erie was most propitious, as far as weather was concerned. Most of the big cars pulled out rather early for a race into Cleveland. Our car, the Arrow, was among the last to leave. At the start our motor did not seem to give its full power, and, as the operator thought the reason might be a dirty cylinder or stuck valves, we halted at a grocery store a short distance out and procured some kerosene, which was injected into the cylinders. As this remedy did not prove effectual, we stopped a little farther along and replaced the exhaust valves, which were found quite badly pitted, as was to be expected, considering their 1,000 miles of service without grinding. The plugs were cleaned, and one of them, which was broken, was replaced. After twenty-five minutes of work we were off again, with the motor developing splendid power.

The forenoon's run included several hard hills and some long sandy stretches with



SIXTH DAY'S ROUTE.

urday night and could scarcely keep his eyes open. His observer was in almost as bad a plight. Cowan said that his car was in sorry shape, and it had taken him since 3 a. m. until the time he arrived at the garage to make the last 16 miles of the run from Buffalo to Erie. He was troubled by his motor heating up as a result of having the wrong sort of cylinder oil, and to make matters worse he had lost one of his fan belts. He reported that Martin on the other Knox was in an equally bad plight and was running on kerosene, having run out of gasoline and being unable to secure any more had gone to a farmhouse and purchased kerosene, which he put in the tank. It was possible to start the motor if it was slightly warm, and then it was an easy matter to keep it going. This machine had not reached the Erie garage at the time the officials left.

The aggregate selling value of the 140 cars entered in the British Reliability Trials is said to be \$325,000.

deep ruts, through which it was no pleasure to drive. We passed two of the multi-cylinder air cooled cars, both of them having difficulty with their exhaust valves. These valves are not made of nickel steel, the generally accepted material, and, as they run very hot, they soon pit badly and destroy the compression and the power of the engine.

A little further along we noticed a machine evidently "held up" by tire troubles. When we stopped for lunch at Geneva, our machine was working beautifully, and lubrication and filling the gasoline tank was the only attention it seemed to require. When we started away from the hotel, however, the power seemed very weak, and the difficulty seemed one of ignition. It was found necessary to clean the timer and readjust it before the motor would operate perfectly. In so doing a small set screw was lost, the lack of which occasioned some trouble. The float chambers of the carburetors were drawn off and a considerable amount of water was extracted from

them, which had been bothering us a good deal.

At this time it was thought desirable to replace the air fan belt, which was found to be badly stretched. We were soon off and running finely over the excellent dirt roads which make up the most of this stage.

Toward the last of the trip, as Cleveland is being approached, the roads become rough and clayey, and they must be nearly impassable in places during wet weather. There were many very severe humps in the road, and at the foot of a steep hill there was a bad gully across the road, and in it was the car which had successfully braved all transcontinental dangers, with its right hand steering knuckle broken short off. Repairs were already well under way.

With the exception of a few momentary stops to adjust the platinum points of the timer, our ride into Cleveland was as uneventful and enjoyable as may be imagined.

One thing that I wish someone would explain is, why defects frequently do not manifest themselves as long as the machine continues in operation, and then develop as soon as the car has been left alone for a while. Often I have returned from a run with the machine performing finely, and after a couple of days of disuse have found that I could not use it at all on account of some defect, which, although it probably existed in some degree while the car was running, was unable to put it out of service until it had been idle for a time. We had two good examples of this today.

There were very few incidents of interest in today's run. The touring cars are showing themselves remarkably fit for long distance work of this sort, and representatives of two popular makes of runabout are demonstrating their right to a classification as road vehicles.

As far as can be learned, tire troubles are not so frequent in this test as they have been in previous ones, considering the severity of the conditions here involved. It is true that on the first day of the run the touring cars of a well known manufacturer experienced almost unlimited tire trouble, the tire used being generally considered one of the very best manufactured; but, on the whole, there have been relatively few machines seen coming in on flat tires and little repairing noticed on the road. Double tube tires are practically universal in this test for the first time, and this should be a cause for congratulation.

At Cleveland.

The garage at Cleveland was at the Central Armory, a spacious building, and was by far the finest shelter as yet provided for the machines. As usual, all persons were excluded from the place, but late in the day S. A. Miles thawed out a little and decided to let the public in to see the cars, announcing that the doors would be open at 7 p. m., the machines first having been

roped off, so that no one could reach them. A large number of people availed themselves of the opportunity to look the machines over.

The Columbia No. 2 lost sixty minutes as the result of tire troubles, being obliged to put on a new rear shoe. The Haynes-Apperson car No. 30 had been delayed en route twenty minutes by tire troubles. Car No. 20, Fredonia, was also delayed for about thirty minutes as a result of tire troubles, having punctured one of the front tires. Stearns No. 35 finished at Cleveland with only one cylinder working, the other having its jacket damaged, allowing the cooling water to leak out. The jacket was replaced at the garage. Several chickens were killed by Stearns in his rather wild race to get into Cleveland first.

A telegram was received from Buffalo to the effect that the Rambler No. 17, which had not reported at any garage after Pine Hill, had left Buffalo at 5 o'clock Tuesday, and would run night and day to catch up with the crowd. A dispatch was received from Buffalo late Tuesday night, stating that one of the Fredonias, which had been tied up waiting for sprockets, had arrived there and started for Erie at 6:30 p. m., with Thomas driving. They hope to catch the crowd at Youngstown.

A message from Erie stated that St. Louis No. 42, with Dorris driving, arrived there at 2:50 p. m. and left for Cleveland at 3:20, resolved to run all night, if necessary, and be in Cleveland in time for the start Wednesday morning.

It was expected that a smoker would be given by the Cleveland Automobile Club to the contestants, but for some reason unexplained the event was called off.

Refreshments and a light lunch were kept ready all the afternoon and evening, however. A number of the contestants put in their time by going to the theatre.

The Start from Cleveland.

Wednesday morning dawned clear and bright and the contestants were all astir shortly after 5 o'clock getting ready to make an early start. Tom Fetch, the operator of Packard, No. 16, had received permission to start out with Old Pacific at 6 o'clock Eastern time, or 7 o'clock Central time, to admit of him being the first contestant to reach Warren, Ohio, his home town. He had worked a good portion of the night in getting his car into shape after his rather unfortunate accident while coming into Cleveland, where he was laid up by a front knuckle joint breaking.

The St. Louis car, No. 42, was seen in the garage, having gotten in late Tuesday night, after a hard drive from Buffalo. The press car, delayed by tire troubles, also managed to reach the garage at the Central Armory. The tire question has been a rather serious one on this run. All the tire manufacturers had representatives following the contest, and shipped tires of all sizes and sorts in advance to the noon

and night stops. In some cases the tire men were compelled to hire rigs and drive out to help contestants stalled as a result of tire troubles.

It was nearly 7 o'clock Eastern time when the main crowd of contestants were started out on the run from Cleveland to Youngstown, Ohio. The roads on this stage, although not muddy, were badly cut up and rather hilly, the grades varying from 6 to 15 per cent.

The start was made as follows: After No. 16, Packard, at 6 a. m., 15. Pierce, 6:52; 35. Stearns, 6:53; 5. White, 6:54; 6. White, 6:54; 2. Columbia, 6:55; 10. Toledo, 6:55; 23. Knox, 6:56; 9. Toledo, 6:57; 26. Franklin, 7:00; 14. Pierce, 7:07; 41. Olds, 7:07; 39. Olds, 7:08; 27. Franklin, 7:22; 18. Rambler, 7:22; 30. Haynes-Apperson, 7:35; 36. Locomobile, 10:55; 42. St. Louis, —.

ON CAR NO. 14, PIERCE ARROW.

Tuesday's run, although quite severe in some respects, has not proved the downfall of any of the machines or been the cause of many breakages. In fact, the machines which have come through to this point are pretty thoroughly seasoned and tested out and might reasonably be expected to last out the run.

The road through this section is almost a continuous succession of hills for the first half of the way and there are a great many clay spots in the hollows, with very bad humps in them, which strain a machine badly if much speed is attempted. The latter part of the way the road is more level, but is rutted and sand or clay with many very rough spots.

We started among the latest of the touring cars and as soon as we were on the road found that the motor was not performing in its usual exemplary manner, owing to faulty ignition in one cylinder. A stop was made in Cleveland and the necessary adjustments made in the platinum points of the contact device, which set matters right at once. When a few miles out we passed a Franklin undergoing some slight repairs, which must have been soon completed, as it passed us very shortly after. All went well with us until we were approaching Warren, when there was a sudden "snap," and we were soon aware that the left hand rear spring had broken. All the leaves were found to have given away, breaking through the bolt hole by means of which the spring is fastened to the axle. As there were no extra springs on board the only thing which could be done was to block it up and proceed. A wooden block, intended for this purpose, was at hand and the inner tube of a tire was secured between the block and the frame of the machine, to act as a buffer. The block and rubber were securely strapped to the axle and we were once more ready for the road. Youngstown was reached in good time without further incident, but a great deal of intermediate and low gear work was necessitated, as the level stretches where the high speed would

carry were few and far between. The breakage of this spring is attributed to the unusual weight which the machine is called upon to carry, including, in addition to its four passengers, a large amount of tools and supplies and some personal baggage, as well as an amount of mud caked over every external part, which can hardly weigh less than 100 or 150 pounds.

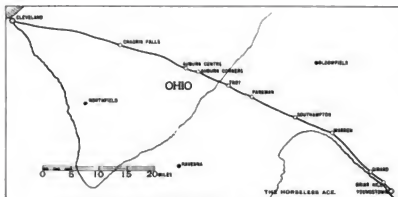
I believe I am right in saying that all the machines which reached Buffalo before Monday morning are still with us. It was the run from Pine Hill to Binghamton that weeded out the weaker machines and determined the survivors. Indeed, two at least of the belated machines have now caught up with the rest of the party, after giving most strenuous exhibitions of continuous day and night driving.

Surely the industry may be proud of possessing within its ranks men who can set such examples of dogged persistency as have some of these operators. The details of the vicissitudes experienced by some of these operators who are now catching up with the schedule will probably never be publicly known, as the publication of the technical features of the performance of their machines seems rather to be discouraged "in the interest of the industry," and to be regarded as family secrets, if not "skeletons in the closet." Operators are instructed not to give out data of this nature, and this renders the collection of technical facts about as easy as the securing of political news in Russia. While the official press representative appears willing to give out as much news as he is allowed to dispense, the atmosphere is generally one of suppression. The contrast in this respect between this test and those managed by the Automobile Club of America is very marked.

At Youngstown.

The officials and press men, as usual, made for the first train and started on to Youngstown, hoping to reach that place before the contestants, but they were unable to do this, as several machines were already in when they arrived at the town and were stored in a roped off enclosure under a viaduct, which served for a garage. Old Pacific was among these, having come through in great shape. The people of Warren had turned out en masse to welcome Fetch, and the town was decorated for the occasion by order of Mayor Sloane.

There had been a lively race between the White car, driven by Jay, and Stearns No. 35. F. B. Stearns. The driver of the last named car has during this run won for himself the reputation of being a rather reckless and fearless driver. He wanted to reach Youngstown first, and put his car through in a manner that made the hair of those who were with him curl. The cracked jacket on his car had been repaired, and a short distance out of Cleveland there was a sudden smashing and grinding noise and Mr. Stearns at once stopped his motor.



SEVENTH DAY'S ROUTE.

It was discovered that the crank case cover over the front cylinder had fallen into the crank case and mixed things up with the piston rod. Luckily, beyond grinding up the cover, no damage was done, the piston or connecting rod not being broken. After the pieces of the cover had been removed the engine was started and the run continued, Mr. Stearns pushing the car ahead still faster to make up for lost time.

While going down a steep hill at express train speed he partially lost control of his car, and skidding a little, narrowly escaped going over a bridge and into the water several feet below. It was a close call and an experience that those in the car will not forget for some time. Finally, when nearing the garage at Youngstown, an express wagon driver backed his rig into Mr. Stearns' car, smashing one fender on the auto and bending one of the steering knuckles slightly. Luckily the machine was going slowly at the time, or still greater damage would have been done.

From all accounts it is evident that Mr. Stearns was in no way responsible for the collision and could not possibly have avoided it. The Stearns car also suffered from a fractured front axle in the early part of the run.

The residents of Youngstown, including its many pretty girls, turned out and gave the autos a warm welcome. Their time of arrival and order follows, as given officially by the press bureau: No. 5, White, 11:43 a. m.; 35, Stearns, 11:44; 16, Old

Pacific, 11:45; 2, Columbia, 11:46; 6, White, 11:47; 9, Toledo, 12:31 p. m.; 26, Franklin, 1:11; 23, Knox, 1:37; 10, Toledo, 1:39; 39, Oldsmobile, 1:48; 41, Oldsmobile, 1:49; 18, Rambler, 2:00; 27, Franklin, 2:16; 14, Pierce Arrow, 2:54; 30, Haynes-Apperson, 3:14; 15, Pierce, 3:33; 36, Locomobile, 5:30.

Rambler, No. 18, had some tire trouble, Franklin, No. 26, was delayed half an hour owing to the chain breaking while running down hill. The emergency brake held them and prevented an accident. The chains of all the cars are badly worn. All the operators reported a very dusty run over roads that in rainy weather would have been practically impassable. All the heavy cars are using rubber buffers to prevent the springs from closing too far, all of them being weakened by the strain of rough roads.

Augustus Post, a New York banker, followed the run in his White touring car, accompanied by R. H. Johnson, and had little trouble en route. He made the run of 200 miles from Buffalo to Cleveland without any important stop and also continued from Cleveland to Pittsburgh with only a short stop at Youngstown for refilling tanks.

A dispatch was received from Cleveland Wednesday evening stating that Rambler, No. 17; Columbia, No. 3, and the two Fredonias had left there and were on their way to Youngstown, and expected to arrive some time during the night. The



ROAD LEADING INTO CHAGRIN FALLS.

hotel accommodations at Youngstown were entirely inadequate, it being necessary for the contestants to bunk three and four in a room. The night was spent quietly, everyone turning in fairly early in order to be up and ready for the start of the last day's run.

The confetti distributed by the pilot cars seemed to be annoying to local street cleaning departments. In Cleveland the street sweepers began to carefully sweep all the bits of paper up soon after it was strewn, and the same thing happened in Youngstown.

The Start from Youngstown.

The last day's run was only 67½ miles but was through a very hilly country, with the roads none too good. It was the general impression of all concerned that this stage of the contest should have been accepted as a hill climbing contest, as any machine that could surmount the grades encountered could travel over most any sort of road. Between Glenfield and Emsworth a 13 per cent. grade was met, and an up grade of 17 per cent. on bad stony road is struck before Avalon. The road leads from here to Bellevue, Woods Run, Alleghany, and thence to the official garage. Banker Brothers' Automobile Palace, at Baum and Beatty streets, and the end of the run.

It had been planned during Wednesday evening to let the small cars start an hour before the more powerful ones, as all were to wait at Alleghany, Pa., and go into Pittsburgh together, escorted by the members of the Pittsburgh Automobile Club, who were to run out to that place and meet the contestants as they came in. It was later decided, however, to have all the cars start at the regular hour, and agreed that all should meet at Alleghany, so that as good a showing as possible might be made in the form of a triumphal entry and parade into Pittsburgh.

The St. Louis car No. 42 reached Youngstown at 7:35, and Rambler No. 17 also got in. These two cars had a hard fight, having been missing since Pine Hill, and they had run night and day to catch up. The two Fredonias and Columbia No. 3, which were reported as having left Cleveland, had not put in an appearance at Youngstown at 7 a. m. The Columbia had been delayed by tire troubles.

In the evening a collection was taken up among the contestants at the Todd House for the purpose of raising a fund and purchasing a floral tribute for Mrs. Riker. She had won the admiration and respect of every man on the run by her bravery in sticking to the machine her husband drove, despite the weather conditions. She was indeed the heroine of the occasion.

Attention was called at the garage at Youngstown to an accident which No. 30, Haynes-Apperson, met with just outside of Cleveland, and which had been kept rather quiet. Both knuckle joints snapped off at once while the car was about 2 miles out

of Cleveland. The front of the machine dropped down and "Pop" Lowe, the observer, was hurled from his seat, landing on all fours in the road some feet away. Driver Frank Nutt was not thrown out, being pinned in his seat by the steering wheel. Lowe fortunately was not hurt, and scrambling to his feet went to Nutt's assistance. The latter had evidently considered such an accident possible and had two extra knuckle joints with him. The front of the machine was jacked up, and then it was found that the knuckle joints were broken off so close to the wheel that it was impossible to get hold of them with an ordinary wrench. Nutt did not have a Stillson with him, and it was "up to" Lowe to hunt around.

After visiting every house for a mile and a half along the road he managed to get a pipe wrench, and returning with it got the broken knuckle joints out. Lowe is authority for the statement that one of the wheels as it broke off coursed across the road, and, striking a stone, bounded over a barbed wire fence into a field. The bent steering rods were hammered straight and the run to Cleveland was continued. At Youngstown it was decided that these steering rods were not safe and new ones were secured and put in. It was then that the story of the accident first became generally known.

Thursday, the last day of the contest, dawned with Youngstown wrapped in a thick fog, which even as late as 8 o'clock had not been dispelled by the sun. It was raining lightly at the time of the start. The pilot cars had gone on Wednesday night and 'phoned back to Youngstown to warn all contestants to inspect their brakes and chains well, as some dangerous hills would be encountered.

The largest crowd that had as yet turned out greeted the contestants as they lined up in the fog, preparatory to starting. There was some confusion as to the right road leading out of Youngstown, but this was finally straightened out, and exactly at 8 o'clock Eastern or 7 o'clock Western time Official Weigher Downs sent the first car over the line, it being White, No. 5. The others followed in this order: No. 2, Columbia, 7:00:30; 9, Toledo, 7:01:35; Stearns, 7:02:30; 6, White, 7:03:41; Olds, 7:03:30; 30, Haynes-Apperson, 7:04:23; Knox, 7:05:18; Rambler, 7:05:30; 16, Old Pacific, 7:06:26; Franklin, 7:06:30; 10, Toledo, 7:07:27; Franklin, 7:07:30; 36, Locomobile, 7:08:42; St. Louis, 7:09:30; 14, Pierce Arrow, 7:10:30; 15, Pierce, 7:11:17; Rambler, 7:12:30; Olds, 7:13:13. The Fredonia, No. 10, reached Youngstown at 8:15, after an all night run and continued on toward Pittsburgh.

The Last Day's Run.

AS SEEN FROM CAR NO. 14, PIERCE ARROW.

It certainly was not the policy of the projectors of the New York-Pittsburgh run to "save the best for the last," for the final

stage—from Youngstown to Pittsburgh—was in some respects the severest ordeal of all. Of course the run from Pine Hill to Binghamton proved the most disastrous of all, but that was mainly on account of the weather conditions and not by reason of the inherent difficulties of the road. I am satisfied that if the weather on the last day had been such as was experienced during the run into Binghamton very few machines would have successfully reached the goal. This is also true of the run from Cleveland to Youngstown. Clay roads, which become soft and slippery when wet, are the worst difficulties of the automobile, as they not only render the vehicles more or less unmanageable but reduce the traction of the driving wheels to a minimum. Both the last stages comprised roads of this character. The final stage of the run included the steepest and hardest hills of the whole tour.

We left Youngstown under cloudy skies and before we were many miles out a steady drizzle set in, which continued for a considerable part of the day's run, and began to render the road very slippery and dangerous, especially on the bad hills.

Before we had gone far we found we had but one cylinder working, and two momentary stops were made to adjust the platinum contacts of the breaker. A short time after the motor stopped, and the cause was soon discovered to be a broken contact spring. Examination seemed to show that it had been fractured for some time and had only been held together by a small unbroken portion. Fortunately, an extra spring had been carried and it was soon in place with a great improvement in the operation of the engine. No doubt the bad condition of this spring had been the cause of the adjustments which had been found necessary.

We passed one of the four cylinder touring cars, which was stopped apparently by a tire trouble, and also overtook one of the non-competing cars laid up from the same cause. One of the tire shoes lay upon the ground, completely severed—an accident which is seldom witnessed. Bad rocks obtruded themselves from the road surface in places to a height that menaced crank cases and mufflers.

The hill a little beyond Enon was a decidedly hard proposition, as it has a clay surface which was thoroughly lubricated by the rain that had fallen, and in addition the track is full of sharp stones and outcropping ledges. In the steepest and most slippery portions the wheels had no adhesion and spun about uselessly. The only thing to do was to pile out and push, which all but the operator cheerfully did, and successfully brought the car to the surface. I fancy that the passengers of most of the cars did the same thing at this point, and it is nothing derogatory to a car to be forced to resort to this expedient when the trouble is lack of traction rather than lack of power. There were one or two other hills on which the car in its

heavily loaded condition required some slight assistance.

Through the business portion of Allegheny the streets were very roughly paved and exceedingly greasy, and great expertness was demanded on the part of the operator to safely traverse them.

It is perfectly proper to pay tribute to the ability of Mr. Sheppy, the operator, a gentleman who takes no chances and who evidently believes that an automobile on the road is worth two in the ditch. Such operators are the ones that aid the industry, but they do not fatten the columns of the yellow press with any broken records—or axles.

I have recounted with almost brutal minuteness each technical detail of this 800 miles of mud and hills, for what I conscientiously believe to be the good of the industry, although I know that such a policy is discountenanced in official circles, and I heartily admire the manufacturer who has a just faith in his product sufficient to warrant him in taking a man as a passenger whom he knows is given to such a course.

I should like to point out that the only replacements we have made of what may be considered the permanent parts of the car are the renewal of the considerably overloaded springs. Spark plugs and tremblers are supposed to give out after a certain amount of use. Everyone expects exhaust valves to begin to leak after a certain mileage, and flexible pump connections, like all springs subjected to a constant vibration, are given only a limited life.

During the trip neither the motor crank case, the transmission case nor the housing of the flexible shaft drive has been removed to my knowledge, nor has the clutch, which must have been engaged many thousands of times, been readjusted. The bearings of the running gear have not been touched, nor has anything been done upon the machine other than previously enumerated. The car must be one of the most lightly penalized vehicles in the run.

If any official inspection is made upon it it will be in the nature of an examination and not an inquest, which I fear will be needed upon some. The perfect enclosure of the change speed gears and the transmission to the axles, together with the fact that the motor is well out of the mud, and the careful handling which the car has had, have contributed toward its reaching Pittsburgh in what I believe will be found a satisfactory condition, free from undue wear and tear.

The Arrival at Pittsburgh.

The press representatives and officials followed by train and passed several of the cars on the road, the passengers and observers waving their hands in recognition of the shouts of those on the train. The crowd upon reaching Pittsburgh went at once to the Hotel Schenley and waited for the autos to arrive.

A committee of the Automobile Club of Pittsburgh, headed by Arthur Banker, Reuben Miller, Jr., W. C. Temple, Linford Smith and J. Francis Burke, met at the official garage at Banker Brothers' in Baum street and started from there for Allegheny, Pa., where they were to meet the incoming machines. A large number of club members turned out with the cars, making quite an imposing showing. The official machines were decorated in green and red, the colors of the Pittsburgh Club. They met the White and Pierce pilot cars, White No. 5, Columbia No. 2, White No. 6, Augustus Post's White car running independently, Franklin No. 27, Franklin No. 26 and Rambler No. 18. The machines waited for an hour or more for the others, and then, as it was growing late, decided to start on toward Pittsburgh. This arrangement was a good one, inasmuch as it positively prevented any wild racing to be first into Pittsburgh.

Large crowds lined the streets and



LAST DAY'S ROUTE.

cheered the dirt covered drivers in their muddy machines. The weather had cleared and the sun was shining brightly as the cavalcade finally drew up in front of the Schenley Hotel, at 1:35 p. m. A large crowd gathered on the hotel porch and cheered the arrivals. The procession was headed by the official car, followed by the press cars, the Pierce Arrow pilot car, the White pilot car, White No. 5, Columbia No. 2, White No. 6, Post's independent White, Franklin No. 26, Franklin No. 27 and Rambler 18. These, after a short stop to be photographed, proceeded on to the Banker Brothers' garage, where the machines are to remain until the official examination of their condition is made.

No. 35, Stearns, got in at 2 o'clock, after having been ditched and suffered two collisions. The last stage of the run was Mr. Stearns' wildest trip. A story of his adventures and wonderful escapes is given elsewhere. No. 36, A. L. Riker's Locomobile, got to the hotel at 2 p. m. Mrs. Riker was given a warm reception and was pre-

sented with a large bouquet of American Beauty roses by the contestants.

Following is the official list of arrivals: No. 2, Columbia, 2:00; 5, White, 2:00; 6, White, 2:00; 9, Toledo, 4:12; 10, Toledo, 3:15; 14, Arrow, 2:48; 15, Pierce, 3:44; 16, Packard, 2:22; 17, Rambler, 4:32; 18, Rambler, 2:00; 23, Knox, 2:51; 26, Franklin, 2:00; 27, Franklin, 2:04; 30, Haynes-Apperson, 2:35; 35, Stearns, 2:07; 36, Locomobile, 2:17; 39, Oldsmobile, 2:58; 41, Oldsmobile, 5:40; 42, St. Louis, 2:25.

All the cars went at once to the garage after reporting at the hotel and were assigned places and the observers' books taken. A crowd that fairly blocked the street awaited them and greeted each arrival with cheers. All the machines were carrying pounds of mud and were anything but pretty to look at. All the operators had received telegrams, however, from the factories instructing them not to clean the cars, but to ship them back as they were. It was evident that the mud had a commercial value from an advertising standpoint. Car No. 30, Haynes-Apperson, had a tire and pump hanging on the side of the rig encrusted with mud and completely covered.

Columns could be devoted to a description of the men and the machines, but let it suffice to say that the men were tired and happy to be in, and the machines were dirty and unsightly in every respect.

A message received at Pittsburgh stated that Knox, No. 24, stalled at Painesville, had secured a new roller bearing for the front wheel and was coming along. No. 3, Columbia, and the two Fredonias were also reported as coming along in hopes of reaching the garage at Pittsburgh before it closed at 12 o'clock Thursday night. The Haynes-Apperson tonneau, which smashed its water pump, engine and crank case at Pine Hill, as the result of a connecting rod breaking, was also reported as trying to reach the finish.

A number of the contestants left Pittsburgh on the night trains Thursday, deciding that it was all over and they had about had enough of it. No regrets were heard that the run had terminated, as it was far from a pleasure jaunt at any stage. One representative for each make of cars remained to attend to the shipping of the machines after the official examination.

No official report was made, but there will not be many cars run back under their own power. Mr. Post will run his White car home, taking with him J. Harry Sheldon, of the Goodrich Rubber Company, as a passenger.

The following telegram to Manager Miles was received shortly after the completion of the run:

"Let me congratulate you and the contestants in your endurance contest upon the remarkable work they have done in spite of the weather conditions, which were worse than in any previous contest.

"ALBERT R. SHATTUCK,

"President A. C. A."

road conditions due to no fault of either the operator or the car.

In reaching these totals a number of incidents which are clearly no fault of the vehicles have been omitted; for example, one operator spent ten minutes in a pouring rain at 11 o'clock at night building a bridge before his car could proceed. Others were compelled to make detours of from 1 to 4 miles over mountainous roads to avoid washouts. Still others were forced to engage horses to tow their machines from 200 yards to a quarter of a mile in places where the water varied from 2 feet 6 to 3 feet 6 in depth, one of the observers taking the precaution to record the high water mark on the side of his machine, so that there might be no question about the difficulties with which he had to contend.

No attempt has yet been made to tabulate the records of the fourteen additional cars which, for causes above stated, failed to reach the garages before midnight.

In addition to the competing cars the two pilots, a two cylinder Arrow and a White steamer, which started daily from half an hour to two hours ahead of the main body, arrived in Pittsburgh without a mishap and apparently in as good condition as at the start.

An examination of the cars is proceeding, and a report will be submitted to the management three or four days hence.

The record of only 907 points lost through tire troubles is a splendid testimonial to the excellence of American tires. Not a single foreign tire was used on any car in the run.

With the Belated Contestants.

By HARRY E. DEY.

When we left Bainbridge at 3 p. m. Saturday it began to cloud over and soon commenced to rain. The Columbia No. 3 and the Fredonia had left Bainbridge an hour or two ahead of us. Approaching Nineveh we were warned of a couple of bad ponds ahead. The man said that the Columbia had gotten off the road into the ditch, due to the road curving, and that it had been towed out, but that it went through the second one all right. The

Fredonia profited by watching the Columbia, and got through all right. When we reached the first pond Mr. Keller got out in his high topped rubber boots and piloted us through. When we reached the second one we got off into deep water and the engine stalled. After taking some photographs and looking around for a horse without success, the happy thought struck us to use the starting crank to work it out by. The low gear was thrown in, and by turning the crank the machine was gradually worked along into lower water. The engine was then started, and brought us out in a hurry.

Approaching Binghamton we found the road very dangerous, it being on a very narrow embankment between two deep streams of water. We finally came to a red light set on some boards, which were supposed to be a barrier against going onto a nice newly asphalted street. We rode over the boards, and putting on "high speed" gear, fairly flew along. However, we were soon held up by a watchman, who informed us that "you are breaking a State law by traveling on this road, but I let the other feller (Columbia) through, and I guess I kin let you go through." "Good, you are the kind of man we like to meet," said Mr. Haynes. "The other feller gave me half a dollar, and if not too much trouble you can do the same," said Mr. Watchman. He got it and we continued with our law-breaking.

We reached Hotel Bennett in Binghamton at 8:45, intending to keep right on after supper, but by the time we had eaten and got the machine oiled, gasolined and watered, it was 11:30, so we decided to retire and start off at 4 o'clock in the morning.

At 4 o'clock Sunday morning we reluctantly left our beds, and at 4:30 were off in company with Columbia, No. 3, we having agreed to stick together during the day so as to help one another in case of washouts.

The Columbia was a short distance ahead, and at 5 miles out we found them stopped, reconnoitering the road where it went under the railroad tracks. The water had backed up from the river and completely

covered the road. We ran in as far as we dared and then backed out. After one of the occupants, in high topped rubber boots, had succeeded in getting his feet wet without reaching the maximum depth, it was decided that it was a case of being towed or taking to the railroad tracks. We had been following the trolley track, and it turned at the railroad and ran parallel with it. After leaving the road the space between the ties was not filled with dirt. The Columbia started back to look for a horse, while our people took a walk down the railroad to get the "lay of the land." It was found that by following the tracks for about a mile we could strike the road again and also avoid another sink hole. We advised the Columbia to that effect and started.

Well, if ever a wagon got bumped that one did then. Mr. Lauterman had the machine to himself, as the rest of us walked. We frequently had to help it over switches, frogs, etc. Finally we reached a crossroad and decided it would be better traveling on the steam railroad track. A watchman close by informed us that a train was not due for forty-five minutes, it was against the rules, but he "guessed he would not see us." One machine (Fredonia) had taken the same course the night before. We found this road much better than the trolley, having only a few bad places. Finally leaving the railroad, we continued on to Union, arriving there at 7:30.

We stopped here for breakfast and to repair the radiator, which had been struck while straddling the ends of the railroad ties. This was quickly repaired with wood plugs, and we left Union at 9:15. While we were waiting there the Columbia came in. They had found the railroad too rough and had obtained a horse to tow them over the first pond. The second one they were able to ford without help. They left Union ahead of us. The landlord of the hotel informed us that a disabled White machine had been shipped home from there a day or two previous.

From here on the roads were very bad, muddy and rough. Near Hiawatha (which must be a fancy way of spelling high water) there was 5 feet of water over



CLEVELAND—WAITING FOR THE CARS TO ARRIVE.



HAYNES-APPELSON RUNABOUT IN CHAGRIN FALLS.

the road. We started to make a 2 mile detour, but had only gone a short distance when, with two or three awful grinds, we came to a stop. We had investigated an ominous squeak a short time before, but had not located it. Upon investigation it was found that the ball end thrust bearing in the differential had ground up the balls and broken the ball race, allowing the differential gears to separate. It looked very much as if we were down and out, but after inquiring of some of the natives who happened along it was decided to make a new ball race at Owego, the nearest town, 2 miles away.

Fortunately for us Mr. George Tarkington, the official observer appointed by the Haynes-Apperson Company, after serving on one machine for two days, had left and taken passage on the Columbia, and during our railroad experience joined our party. He now came in very handy, as he is an expert machinist and repair man. He and Mr. Lauterman took the axle apart and found the gears still intact. The live axle was taken to Owego, a machinist was hunted up, who kindly opened up his shop (this was Sunday), fired up and gave our party carte blanche to do as they pleased. Mr. Tarkington put in about five hours making two ball races, some balls were obtained from a bicycle shop, a livery rig hired and the men brought back to the auto. It was just twelve hours from the breakdown to the time we were ready to go again.

We were treated here with the greatest kindness. The machinist, who opened up his shop, got up steam and let us work for five hours, did not want to accept any pay. We had only been stopped a few minutes when a boy came with a big paper bag holding nearly a peck of nice apples. Said his mother thought we would like some apples and sent him down with them (those same apples were our breakfast and dinner the next day). Rev. R. J. Smith, who lived close by, had the three of us, who remained with the car, go up to his house to dinner.

At 11:30 p. m. we started on to Owego, where we stopped at the Ah-wa-ga House. We arose the next morning at 4 and got an early start. Shortly after leaving, however, we got onto the wrong road, it being too dark to read our book, and some of the confetti had blown over into the other road. At least two other machines had made the same mistake, and their tracks helped to mislead us. The consequence was that we climbed a very steep mountain. The other machines had turned around on top of it and we had to follow suit. This cost us at least one hour.

At Smithboro bridge our guide book says: "Toll, 25 cents; has been paid by N. A. A. M.; don't stop." But circumstances alter cases. The farther approach was under 30 inches of water. We stopped for a tow, and paid a dollar toll to the owner of the horse. After crossing we

tried to get breakfast at a tavern, but were informed that we would have to wait half an hour. Time was too precious for that, so it was a case of "off agin, on agin, gone agin," and away we went, only to bring up against another "damp" place, which we were told was too deep to ford, but that we could make a detour by going over a mountain. When we reached the foot of the mountain we heard some of the other machines shugging away farther up.

On this grade a new species of trouble cropped up. Our gasoline was only 2 inches deep in the tank, and when we struck a grade of about 25 per cent. it would not run into the vaporizer, and so we stuck; but finally threw in the low gear and cranked it over the steepest point. This allowed us to start the engine again and run some distance farther; but the next real steep place stalled us again. A farmer towed us up the rest of the way, and would only accept a quarter, although we insisted that he should take more.

While "seesawing" on this mountain we broke our brake band bracket, putting the brake entirely out of commission. While at first feeling somewhat nervous about running without any other brake than the engine clutch, by the time we reached the next town our confidence was restored and we decided to continue without repairing, which we did. We finally reached Waverly along in the afternoon, well prepared to eat our breakfast.

Continuing on through Elmira to Corning we caught up with the Knox, No. 25, which had suffered from chain troubles. We "seesawed" awhile and reached the outskirts of Corning together. Here our engine developed a very pronounced hammer and upon investigation it was found that the babbit was squeezed out of one of the connecting rod crank bearings, which made a noise like a threshing machine. The car was run down to a livery stable in town and the bearing "doctored" by "taking up." We put up for the night at the Dickinson House and left the next morning (Tuesday) at 6:15.

For several miles after leaving we struck the deepest, stickiest mud of the whole journey. At Cooper's it was up to the hubs. Footprints showed where others, not so fortunate as to power, had to jump out and help their machines along. A little farther along our vaporizer froze up again, the tubing formerly placed there having been removed. We replaced it, taking warm air again from the engine and so remedied that evil. Bath was finally reached, where we found two Northern and No. 25 Knox.

We left Bath at 11:32, reaching Dansville at 3:08. Here we lunched and purchased sandwiches, etc., for supper. Kysorville was reached at 4:23 and Mount Morris at 5:20. Here we took on gasoline and water and got off again at 5:38. The roads were good now and we were making good speed. Nothing special happened until near Batavia, when our connecting rod trouble

developed again. We got into town about 10 o'clock and into a livery stable, and as it was after midnight when finally fixed again we decided to "bunk" in an omnibus until 4 o'clock and then take another early start. This we did, using lap robes to keep us warm.

We neglected to obtain gasoline at Batavia and between Corfu and Crittenden, some 12 or 15 miles farther on, we came to a sudden stop. Investigation showed an empty gasoline tank. There were only three of us in the machine at this time, Mr. Haynes and Mr. Keller having gone on to Buffalo by rail from Bath. Mr. Lauterman started afoot for Crittenden. Mr. Tarkington for the neighboring farmers. A farmer coming along got a gallon of gasoline for us at the creamery he was bound for, 2 miles away, for which we paid a quarter.

After a stop of an hour we went on to town to find Lauterman. We were told that he had hired a rig to drive 4 or 5 miles away to another town, the only place in the neighborhood where gasoline was kept, so we ordered breakfast and waited. About the time that was ready Mr. Lauterman came in with a 5 gallon can. We disposed of the breakfast and gasoline and were "off agin."

We now made good time to Buffalo. Here the remaining babbit was taken out of the connecting rods and the cap planed off so as to utilize that as a bearing—it is made of aluminum bronze. We had no further trouble with the rods after this. We left Buffalo at 2:52, with everything working fine. Mr. Lauterman had gone on by train to Erie, our company now being composed of Messrs. Haynes, Keller, Tarkington and Dey.

We reached Erie during the evening, where Mr. Haynes took the wheel. Mr. Tarkington, who was exhausted from loss of sleep, took the train. The writer was so sleepy that he could not keep awake, in spite of the constant jolting, and Mr. Haynes at the wheel also found it very hard to keep awake. He afterward said that he found himself dozing a number of times. Several times we got off the course, but got back again all right. When about 25 miles from Cleveland it commenced to rain. It did not last very long, but it served to make the roads very slippery, and we drove the 9 miles of brick and asphalt pavements, entering Cleveland at about a 6 mile an hour gait, arriving there, I believe, about 9:15 Thursday morning. Here Tarkington and Lauterman took the place of Haynes and Keller, and a little before noon we started again.

Near Chagrin Falls we came near witnessing a serious runaway accident. At Auburn Corners we took on gasoline and water. Shortly before reaching Warren we found a collar on the shaft intended for shifting the spark head had become loose and the spark shifter ceased to work. It had probably been loose for some time, and been shifting around to different points at

the engine at times would have great life and at others appear almost dead, and for no known reason. We repinned the collar and gave it an additional extra lead by shifting a gear one tooth. The engine power immediately increased 50 per cent. over what it had been at any other time during the run. The road was very lumpy, and we were soon stalled with a broken spring hanger, the increased speed of engine, our anxiety to get ahead and the lumpy road not being compatible. A heavy thunder shower came up at the same time. We limped into Warren, went to a livery stable, robbed a front spring of a buffer and placed it under the broken hanger one, got some strong wire, wiring the hanger together, and started off again in a pouring rain. We could not make much speed now, as the roads were so slippery and steep. We left Warren a little after 7 and reached Youngstown about 9 o'clock. We stopped a few minutes at the Tod House and then continued, finally reaching Petersburg, about 15 miles beyond Youngstown, where we decided to stop for the night, as we saw that it was utterly impossible to reach Pittsburg before midnight, when the time limit would expire.

The rain had just stopped, the clouds were breaking away, but we were wet and cold. We woke up "mine host" at a little tavern, and he lit up his natural gas heater, which thawed us out somewhat. He let it burn the rest of the night, so our outer clothing got fairly dry by morning. In spite of the rain and the hard jolts the winter slept most of the way between Youngstown and this place.

The next morning we found several leaves broken in both front springs. There was a blacksmith shop handy and we there patched up the part enough to carry us on to Pittsburg. We left Petersburg about 9:30 and soon found we were in a very hilly country. Between Darlington and Beaver Falls we stopped in front of a little brick schoolhouse to get water, a pump being in the front. Presently out came three boys and one girl followed by a young man of about twenty. They informed us they were the school, the young man being the teacher. A few miles farther on we came to the pavements of Beaver Falls. I do not know whether they have a speed limit there. I do know, however, that we didn't, especially after seeing the Columbia stopped there. They immediately started up and came after us, but very soon stopped again. We had supposed that they were at their destination long ago. We came near to coming to grief with a sudden skid that threatened to land us into one curb and immediately after into the other. We straightened our course and again opened the throttle.

In the suburbs of Allegheny the Columbia caught up with us. They called our attention to the fact that they were running on a flat tire and they stopped soon after. We continued on over the river to Pittsburg and out the boulevard on our second



A STRETCH OF NEW ROAD NEAR CHAGRIN FALLS.

speed (10 to 14 per cent. grade several miles) to Bellefield avenue and Hotel Schenley. Here we received a round of applause as we drew in. After our time was taken here (2:15) we continued on down to the garage, where our time was taken as 3:45 (Eastern). An hour or so later the Columbia came in.

The failure of this Haynes-Apperson to make a first class record can be laid to that one little piece of mechanism—a bicycle chain pump drive. We lost a great many hours of time from it the first four days. This brought us in the wake of the flood with all its obstacles; the run on the railroad ties broke the ball race and balls; a detour over a mountain broke the brake bracket. Fast driving over rough roads at night broke the two front springs and rear spring hanger; this cause would also apply to the rear spring, which was broken the first day.

All repairs made on this trip were done with the facilities at hand in the neighboring blacksmith and machine shops. No

new factory parts were used. We had absolutely no tire troubles. I must congratulate Mr. Unwin and his associates in regard to the manner the course was marked and described; there was absolutely no excuse for losing it in daylight.

Endurance Contest Notes.

We are informed that the Locomobile touring car driven in the run by A. L. Riker was the same car which competed in the run to Boston last year and that its total mileage to date is probably 20,000 miles.

It is stated that Augustus Post, who accompanied the Endurance Run in his White steam car, was the only amateur who retained his position with the leaders in the run.

A. L. Riker and wife started from Pittsburg on October 20 in their "Endurance Contest" Locomobile touring car to run back over the route to New York, with the intention of making 200 miles daily.



WEBB JAY IN HIS WHITE NO. 5, ARRIVING AT PITTSBURG.

Some Interviews with Operators.

By HARRY B. HAINES.

The terrible hardships of that never to be forgotten trip from Pine Hill to Binghamton and from there to Bath and Buffalo beggar words in describing the difficulties encountered. That the machines got through at all is little short of miraculous.

The story of the run of the Knox, No. 23, operated by H. M. Davis, gives an insight into the heroic struggles made against the most terrible road and weather conditions. The start of the troubles the car encountered began near Franklin, where a rear tire was punctured. A new tube was put in and the car continued. Some distance farther on this same rear tire blew up with a loud report. A new shoe was put on and then it was found that the foot pump had been lost.

A native was hired to go with Mr. Davis as guide to a house a mile and a half away where a bicycle pump was said to be. It was pouring rain, and when the house was reached the people proved to be most courteous and at once handed out the pump. It was out of repair and entirely worthless. Several other houses were visited at distances of a mile or so apart with no better result, and then, as it was growing dark, Mr. Davis decided to put up for the night. At that time it was pouring in torrents and the country roads were fast becoming small brooks. The machine was covered over and left out in the road, a lamp being hung on it to insure no one running into it.

Mr. Davis and his observer secured quarters for the night and turned in. They were up early in the morning, and after a long search finally secured a pump, got their tire inflated, and continued on toward Binghamton through the deep mud. The trip was a hard one in the rain, and the mud made the use of the low gear necessary for miles at a time. Mr. Davis says that despite this and the fact that his cylinder was slightly filled with mud that splashed up on it, he was not troubled with his motor overheating, as long as he had the proper sort of cylinder oil.

The night was spent in Binghamton, and Saturday morning the start was made on to Bath. It was during this run that Mr. Davis met the most terrible roads and at times was following the road by noting the trees and bushes on either side, the water being from 6 inches to 1 foot deep for miles. At one place he ran along the grass at the side of a road along which a small sized torrent was running, and finally plunged into a hole, where his engine and faw were under water. His motor of course stopped, the water filling the crank case.

The place where he stopped was in front of a farmhouse, and the owner came running out at once and asked if he could be of any assistance. His offer was accepted, and he waded into the water, along with two farm hands, and tried to push the car. It was no use, and a block and tackle was

then secured. One end was fastened to a telegraph pole and the block to the auto, and then Mr. Davis and the rest got hold of the rope and dragged the auto back on the road. The farmer then tried to dissuade him from continuing farther, saying that the roads were impassable and dangerous, but Mr. Davis was resolved to press on. It took him the best part of an hour to get the water out of his cylinder and get things into shape to go on.

He was next stalled by running into a stretch of road where for 1,000 feet the water was up to the hubs of his car. A countryman with a horse was found who for a consideration towed the car through. At the end of this stretch of road there was a crossroad down which a stream was rushing. The water wet Mr. Davis' feet and ankles as he sat steering the machine.

Mr. Davis was greatly troubled by water splashing up on his spark plug, causing it to short circuit. At a country town he had a tin shield made for the plug, and after this no further sparking troubles were experienced. For 22 miles along this route the low gear was used almost continuously.

Bath was finally reached, and Mr. Davis, thoroughly exhausted, went to the hotel there and telephoned to the Knox Company to send a man to Buffalo to relieve him.

The trip from Bath to Buffalo was also a hard one, Mr. Davis driving all night. A bridge was down on the road and a road gang laid planks over a low railroad trestle and the car got over that. Mr. Davis was relieved at Buffalo by Charles H. Martin, who drove the car to Erie, running all night. Mr. Davis met the car there and continued on to Youngstown, and from there to the finish at Pittsburgh.

The machine had one more bit of bad luck before reaching Pittsburgh. In passing over a large rock the flywheel struck, bending the main shaft slightly. The grease cup on the end of the shaft was torn away completely. Mr. Davis thought for a time that he was down and out for good, but he was able to run and managed to get in at the finish in good time, being the twelfth car in. Had it not been for his indomitable will and perseverance there is little doubt that he would have been among the missing.

One of the Franklin men, Mr. Hines, in speaking about the burning of Franklin, No. 28, said that the accident was caused by the carelessness of a mechanic in the factory, who put the muffler on with the seam facing the gasoline tank instead of the rear of the car. It seems that the muffler had blown out as a result of the operator allowing the car to coast down hill with the battery switch off, sucking in gasoline to cool the cylinders. When the switch was thrown on the charges of gasoline mixture pumped into the muffler exploded and tore a hole in the muffler shell at the seam. Had this seam been pointed toward the rear of the machine, as orig-

inally intended, no damage would have been done. The muffler and gasoline tank are only a few inches apart, however. Flashes of fire from the broken muffler played on the gasoline tank connection and melted the solder. The gasoline ran out, caught fire, and, as has been told, the machine was put out of business. The car previous to this time had made a very creditable showing. Its destruction should be a lesson to manufacturers to place their mufflers out of range of the gasoline tank and connections.

B. B. Holcomb, operator of Columbia No. 2, who also drove the same car from Chicago to New York, in conversation with the writer at Youngstown, Ohio, said: "This motor of mine has run over 5,000 miles now with practically no attention and has never stopped as a result of any trouble. It has never kicked up in any way or quit working, except when I shut off the spark."

"I have run for the last 2,150 miles on one Columbia battery, composed of three cells, and have not touched any of the valves. I have removed only one spark plug in all that distance, the porcelain on that having cracked."

"I have done a good deal of running in my time, but I have never passed through such mud as we had to plow through from Pine Hill to Binghamton and then to Bath. The roads in some places were perfect rivers and the only way we could follow the road and keep out of the gully was to watch the rows of trees and bushes on either side. In some places the water was even with the steps of some of the carriages, and in one instance a machine was towed through water so deep that only the seat cushions were above its level."

"Our only serious mishaps were when we ran down a gully on the side of the road and skidded and broke our rear axle in Buffalo. In the former case we got out of the hole with our own power and the assistance of a dozen or more countrymen. At Buffalo the smashup we met with was unavoidable, the machine skidding suddenly when I was obliged to put on the brakes to avoid a collision with a wagon that pulled out in front of me. I was not going faster than 8 miles an hour at the time. Between Kingston and Buffalo we struck some terrible roads, plowing a furrow through the mud, which at times was so deep that both axles were dragging. The roads were, I can safely say, the worst I have ever seen and any machine that got through them is all right, and no mistake."

Ernest E. Roesser, a Pittsburgh newspaperman, rode as a passenger in the Stearns No. 35 from Youngstown, Ohio, to Pittsburgh, Pa. He described the trip as the most thrilling experience he had ever had. He said: "Mr. Stearns put his car through at top speed regardless of road conditions. It was slippery, skidding sort of weather but that didn't count. We cut right along

until we were going down a steep hill about 30 miles out of Pittsburgh. A wagon was ahead of us and Stearns put on the brakes, but we skidded and smashed into the rig, throwing it to one side of the road. The big auto was jammed over to the other side and ditched in an excavation being made by some laborers. Stearns was out in a minute, shouting for the laborers to come and help lift the rig out. A score or more of them responded, and with our help we managed to get the machine back on the road again. It was found that the fender on the right side was smashed and the steering rods bent. The rods were bent back, but did not work well. Nevertheless Mr. Stearns decided to push on and try to reach Allegheny.

"We reached Avalon all right and were climbing a steep hill there with a high precipice on one side when the steering gear again went wrong, and we all got ready to jump for our lives. Stearns was game, however, and managed to get the car back into the road again.

"A short distance farther on a horse was standing in the road, attached to a wagon. Just as we got behind the rig the horse bolted and smashed into us with a crash, carrying away the rest of the fender and breaking the iron stays of the tonneau. This knocked the steering gear out of joint and the car smashed into a telegraph pole, giving us all a good jolt and breaking a front spring and doubling up the steering rods again. We got the car back in the road and then started up the hill, the mechanic, Mr. Patton, running on one side and keeping the wheels straight with his hands while I did the same duty on the other side. We managed to get into Avalon, when Messrs. Stearns and Patton again temporarily repaired the steering gear.

"We then went on, and while crossing a high bridge mixed things up with a gravel wagon. Patton narrowly escaped being crushed in this accident, which was caused by the steering gear breaking. This tore the other front spring apart, but did not break it. Not worried, Mr. Stearns set to work to fix things, and managed to do so, jacking up the car, taking the front wheels off and overhauling the entire steering gear. We then continued on to the finish without further mishap."

It was announced by a representative of the Stearns Company at the Schenley that Mr. Stearns would repair the broken springs on his car, and as soon as it was released from the official examination would start back to New York in it over the same route, making two controls daily, for the purpose of showing that his car was not used up by the trip and was still in good shape. He will take three newspaper men with him. It was also stated that a complete new cylinder was not replaced at Cleveland, as stated; only a new water jacket was put on, these being independent of the cylinder. The front axle of the car is spliced together with iron clips, but will not be replaced, as the repair is considered sufficiently secure.

A Personal View.

By HARRY B. HAINES.

This test is one that will go down in history as the greatest exhibition of the endurance of machines and of men that the automobile world has ever known. When trains were stalled by washouts and roads pronounced impassable, even with a horse and buggy, these determined men pushed on, resolved to overcome every obstacle. It was pure grit and bravery that pulled them through. Soaked to the skin by drenching rains, following roads where the water filled dangerous gullies and ditches, going without food or sleep, they struggled on over as bad roads as autos had ever traversed.

That even one car got through was wonderful, and to the drivers and the observers are due the highest credit and consideration for the great showing made.

The general impression of the run, apart from the opinion of the officials, was that

long as they put their cars through to a finish and had the credit of getting into Pittsburgh. It was plainly evident that the contest would "degenerate" into a mere advertising scheme after all, but this was not surprising, as it was well understood from the start and acknowledged by all but the officials that the sensational advertising feature would be the only one considered. This seems to be eminently the right course for those who had gone to the expense of entering machines to pursue. The manufacturers are not in the business for their health, and when they go to the expense of entering cars in such a contest as this one has been, they certainly want some return for their money. It is only fair to all concerned, however, that the widest and most complete information be given to the public and that they be allowed to know just exactly what happened to every machine entered and what delayed it. The day has passed when a prospective customer can be given a ride around the park and con-



AUGUSTUS POST AND R. H. JOHNSTON IN PRIVATE WHITE AT PITTSBURGH.

a mistake had been made in withholding facts from the newspaper men and the representatives of the technical and trade press. The fact that all the observers had been muzzled and practically forbidden to speak to anyone was considered a rather foolish move, as all the men told their stories, and in many cases observers were working directly with newspapers or their representatives. From the very start there had been an inclination on the part of some of the officials to ignore the newspaper men, and for a day or so they kept this up, but let it be said to their credit that they thawed out a little toward the end of the run and were more courteous and gentlemanly.

As the run neared a close, the various operators became rather careless about stops en route, and many of them publicly expressed themselves as not caring how many points they lost or were penalized, so

vinced that the machine he is being shown is the real article. The dear public are beginning to wake up and do not believe all they hear nowadays; they are too intelligent to believe that there is any car made that won't at some time or other give trouble. The prospective purchaser wants to know the truth and will not be deceived.

The Experience of an Operator

By DUDLEY S. GREENE.

Edward Collier, the operator of Rambler No. 17, made a good run from Weehawken to Pine Hill, having no trouble, but the next day they began in earnest, beginning with two punctured tires on Palmer Hill. This hill seems to be a hoodoo on tires, as during the past summer the writer picked up four punctures crossing it. There were no new tubes at hand, so they had to be patched, which consumed one and three-

quarter hours. Roads were very sloppy; had no stops until they left Delhi, when climbing the long hill out of there the other rear tire went flat. This made considerable trouble, and together with the mud made them late in reaching Franklin, and there they stopped all night, missing the second control. In the morning it was raining hard, so they delayed their departure until 11 o'clock. Their stop at Franklin left them in the rear of the storm and gave the worst road possible. The cars which came through early had much better conditions, but their tire troubles were what made them late the second day and gave them the horrible mud on the third and fourth days. The traveling was so slow that they were obliged to stop numerous times for water and did not reach Unadilla until evening, but kept right on to Bainbridge. Just before arriving there a team became frightened at the headlights and ran away. As far as known no damage was done.

Saturday morning, with the rain still coming down, they left Bainbridge, and found water over the road in many places, but had no serious delays until Belden Hill was reached. On the worst part of the grade the car could gain nothing, although the wheels were revolving rapidly, and they were obliged to go to a neighboring farmer and get some hurlap sacks to spread on the ground to get up the hill. They arrived at Binghamton, and decided to thoroughly rest up before going on, and so did not leave there until Sunday noon. The bunch was ahead of them something over 200 miles, in Buffalo. The rivers were higher still and over the roads in many places, and in one locality they were informed that it was 5 feet deep, so took to the railroad tracks for a mile or more. Pounding over the ties bent the front axle until the wheels were several degrees from the perpendicular. After getting on the road again the water was so deep that it was considered discreet to remove the batteries and spark coil from their accustomed place to the seat. Below Owego they ploughed through water of varying depth, and finally came to a place where it was so deep that a detour around the hill was necessary. In one place between Owego and Smithville they ran for over a mile in water varying from 1 to 2 feet in depth. After passing Smithville there was not much water, but the mud was deep and very sticky, and when Barton was reached they were quite contented to quit and stay over night. This was Sunday night. On Monday they traveled through heavy mud and reached Waverly in about three hours. Took lunch and left there just before noon. Found more water on the road, but not so bad as on previous days. Between here and Elmira they skidded on a hill, fortunately toward the inside, and did no damage further than cracking five spokes in the wheel. The writer is familiar with this hill and can testify to its being a very nasty one. On one side is a

rocky cliff, on the other a sheer drop to the railroad below, and not very well protected by either railing or wall. The surface is very rough, with numerous "water breaks." Had the skid in this case been toward the outside instead of the inside there would have been little to do after buying the flowers and writing the obituary notice. That night they stopped at Elmira and left early the next morning.

In one place they came to a raging creek, the bridge over it gone, and another detour was necessary. This took them around Corning, which, perhaps, was fortunate, as it enabled them to avoid the peat bog swamp on which that city is located. This, however, consumed daylight that they could ill afford to spare, and left them many weary miles to travel after dark. In the evening they again ran into water, and when in the midst of what appeared to them to be a lake came to a bridge. In passing over it the front of the car suddenly dropped down until the bonnet was nearly covered, and there they were anchored good and fast. Darkness was all around them, and as they had no light, it was not only folly to leave the car, but absolutely dangerous. Perched on the back of the seat, they were obliged to wait for daylight.

The tedious hours passed slowly by, and when the morning came help seemed as far off as ever, but their imprisonment was soon to end. A farmer paddling in a boat to feed his stock spied them, and, coming out to where they were, asked them if he could help them. They asked if he thought he could pull them out and get them on dry ground, and he said he would try, and, returning to his barn by the same means by which he had arrived, soon came back riding a horse and leading another. A rope with some difficulty was tied to the front axle, and the front gotten over, and finally the rear also, and they were towed ashore. It took some time to start the engine, but, this done, they reached Bath without further accident. They went to bed or a few hours' sleep and left at noon. From here on the roads were in fine shape for speed, and old 17 was made to do all that was in her, and Buffalo was reached after dark. Here some new batteries were put in and an immediate start made for Erie, where they arrived at 1:30 a. m. Wednesday. There they got something to eat and slept for two hours on chairs in a restaurant, and started on again at 3:30 in the morning, getting into Cleveland a little before noon. Starting on again after a slight rest, they arrived at Youngstown at 7:30 in the evening, catching up with the others and making the control at that city.

Here is a remarkable run and speaks eloquently for the machine, but still more so for the driver, who, in spite of difficulties that would seem were almost insurmountable, pulled his car through to victory. A good car and a good man. Probably few of the drivers showed equal endurance.

The Experience of an Observer.

By DUDLEY S. GREENE.

B. P. Kuhn, who informed the writer that he was an observer appointed by the Northern Company, kindly consented to give a short history of the run from Weehawken to Bath. Mr. Kuhn said that no words could possibly express the trials and hardships that the contestants suffered on this trip from the exposure and long hours of service, and added that he thought the putting through of so many cars under these conditions was the greatest possible illustration of American pluck and grit.

From Weehawken to Pine Hill he was on the St. Louis 42, starting rather late and having an uneventful run to Newburgh, arriving there about noon and stopping for dinner. There had been some rain there, and so the roads on to Kingston were rather muddy, but had no difficulty with the carriage, except one stop on account of the gasoline shut off valve closing by the jar. They passed several cars with tire troubles and one stalled for lack of gasoline. After striking the State road beyond West Hurley good time was made and they reached Pine Hill at 5:30. The car was stored in the official garage, or, as it was aptly put by one man, "the fresh air garbage."

The next day he was assigned to Old No. 39, and left at about 7:15 in a drizzling rain. The first grade encountered was Pine Hill, which caused them no trouble, although several cars had traction difficulties. Made fairly good time through Arkville and Margaretville, and after climbing the long Palmer Hill were obliged to stop to oil the transmission. Here the rain began in earnest, but no more stops were made until between Andes and Delhi, when they were halted by a car with tire troubles. In trying to get around it their vehicle was stalled in the mud, and eventually slid down into a ditch on the side of the road. The machine was unable to help itself out, as there was no traction for the drivers, and "Old Pacific" coming along gave them a helping pull, and they were soon on the road again. From there on it was a slow tedious grind to Franklin, where they arrived at about 3 o'clock. They continued on, and got into Unadilla at 4:30, stopping for lunch and getting away again at 5:30. The rain still continued, and darkness came on soon after 6 o'clock. The roads were covered with water in places, but the mud was thin, so that fairly easy traveling was had with no particular troubles until Belden Hill was reached. They climbed it all right until within 100 yards of the top when something gave way and the machine began to go backward down the hill in spite of the emergency brake.

Mr. Kuhn immediately jumped out on the step to watch the road and see a place in which they could back to one side; but the darkness prevented him from seeing much, and it became necessary to take de-

perate chances and ditch the machine, as it was gaining momentum every moment. This was done, and as luck would have it, without any very serious damage to either the car or the occupants.

The supposition was that the chain had broken, but why the emergency brake had failed was a mystery. Inspection showed the chain to be all right, and nothing seemed to account for it until the wheels were jacked up, when the discovery was made that the right rear wheel was loose on the axle. Further investigation developed the fact that the key was missing, it probably never having been put in at the factory; and the only thing that held the wheel from turning was the pin put through it to prevent it from sliding off the key; and this, incredible as it may seem, had held over all the mountains and through the mud of the drive of over 200 miles. The repair was difficult on account of not having anything to make a key out of, but one was cobbled out of a large pin, and a punch driven into holes where the old pin had sheared off, and the repair was completed. Continuing they reached Binghamton at 12:30.

The next morning Mr. Kuhn was assigned to Haynes-Apperson, No. 30, and which ran very nicely to within a short distance of Owego, where the rear axle broke close up to the differential. In some manner the car was gotten into a farmer's barn a short distance away. Knowing that another Haynes-Apperson was broken down near Binghamton, they walked to Owego and 'phoned up, asking that the rear axle of that machine be taken out and shipped to them. This was done, and the axle arrived late in the afternoon. In the meantime the old axle had been removed. When the new one was put in it was found that for some reason the chain operating the reverse gear was not the same pitch, and therefore the countershaft also had to be removed, and the car operated without any reverse. Unfortunately I am not familiar with the Haynes-Apperson construction, and therefore cannot make this very plain, but presume those of the readers who know this machine will understand it. After completing the repairs they ran on

to Owego, where a stop was made over night.

Next morning they left at 8 o'clock and found the roads flooded from the overflow from the river, which was running banks full. In one place they were obliged to run the machine in water over the axles, but the motor never stopped or skipped, acting as though it was an intelligent thing and knowing that its very best was expected of it. A few miles from Waverly the machine skidded and the whole outfit started for the river, and for a moment it looked as though the car and occupants were to take an impromptu bath, but the differential caught on the edge of the bank and the front wheel was stopped by a tree close to the water; but it was a narrow margin. A kindly farmer helped them back on the road, and then informed them that a little farther down there was deep water that they could not possibly get through; but as there was no road around it, there was no alternative but to try it and trust to good luck. The water came up to the floor boards, but the engine pulled them through, and they got into Waverly at 11:15.

Nothing more of any consequence happened until they arrived in Elmira, when in making a turn the car skidded and swung completely around, fortunately without hitting a curb or doing any damage.

At this point in the story Mr. Kuhn was obliged to leave, so we can give our readers no more, but enough has been said to show the horrible conditions of road and the dangers that were passed through in order to show the world that American machines can do hard work and that our drivers are the pluckiest in the world.

Where the Hill Tests Were to Be Held.

We publish herewith a profile of the hill on Sheridan street, Pittsburg, on which the hill climbing trials in connection with the Endurance Run were to be held. The course begins 200 feet below Bond street and extends beyond Bond street for a quarter of a mile. The 200 feet below Bond street was intended for the vehicles to get

up speed in. It will be noticed that the grade for this distance is only 1 per cent. From Bond street to Seranton avenue, about 250 feet, the grade is 5.24 per cent., and from Stanton avenue to the end of the course the grade is 7.25 per cent.

Some Causes of Failure.

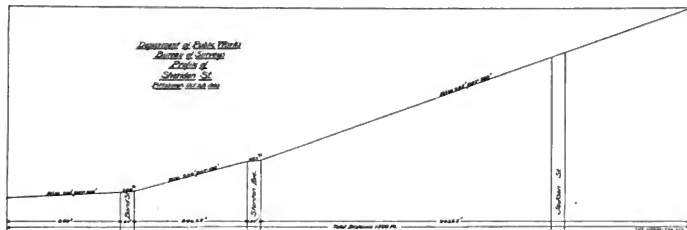
By ALBERT L. CLOUGH.

During a run like the one just concluded, where wet road conditions are the principal cause of failure, it may be of interest to analyze a few of the causes of trouble which such conditions involve.

First and foremost should be mentioned the tendency to skidding and loss of tractive effort due to wet road surfaces. Very little definite is known as to the exact considerations which determine the tendency to skid, and it certainly would be a contribution to the art if the Manufacturers' Association would appoint a committee to carefully investigate the subject. All factors which may conceivably enter into the problem should be considered, such as weight, size and form of tires, length of wheel base, horizontal position of centre of gravity, gyroscopic action of flywheel, the action of brakes of various types, effects of locking the differential, and all other elements which may be supposed to have any bearing. An artificial, experimental skidding surface could be easily arranged by covering concrete pavement with a layer of clay and watering it.

Experiments upon the effect of weight distribution could be made with a car carrying a considerable amount of ballast adjustable fore and aft to enable the centre of gravity to be moved through a considerable range, and an experimental car with adjustable wheel base would not be difficult of construction. It is not believed that theoretical considerations are likely to offer much assistance toward the problem's solution, because the character of slippery surfaces and the connection between their resistance to side slip and the weight imposed are so obscure.

After a very thorough investigation of the causes of skidding, and not until then,



SHERIDAN STREET HILL, PITTSBURG.

will it be in order for another thorough investigation, covering all known means of increasing the resistance of wheels to side slip, and at the same time increasing traction, such as chains, rope winding and such other measures as have been proposed. It is pretty evident that nothing yet devised in this line is effective and at the same time long lived and economical, except, perhaps, for the lightest cars. Chains naturally wear out with excessive rapidity, as the sand and water through which they are constantly running form an almost perfect abrasive. Any fibrous or stranded material, such as rope, is very ill adapted, as it soon frays and gives way in spots, when it all becomes useless.

The effect of muddy water upon the ignition apparatus of the cars is such as to test the integrity of the insulation of all parts to the utmost. Dirty water forms a fair conductor for the high tension secondary current and may, in exceptional instances, short circuit the primary ignition circuits of contact spark systems, which, of course, carry quite a high tension at the moment of break. In the engine in front construction the spark plug and its connections are commonly carried somewhat higher above the ground than in the horizontal type, and the secondary circuits are often shorter and better protected. The contact box and its connections are inherently the most vulnerable portion of the electrical equipment, as they must be as near the ground as the secondary shaft which drives the interrupter, unless the latter is provided with special gearing to bring it to the inside of the dash or some other safe position. Fortunately timers may be enclosed so as to be waterproof, and if their wiring is of the very best there should be little trouble from the wet.

Some machines which are hung very low may actually drag portions of their mechanism through pools of dirty water and be completely enveloped in the splash of thin mud which comes from the wheels, and it is possible for water to enter the air intake of the carburetor and stop the engine. The inlet and exhaust valve mechanism may be completely fouled by mud, unless very carefully protected. In the vertical engine in front type the valves are naturally better protected than in the American type, as they are further from the ground and within a nearly tight bonnet.

After long running in muddy weather every joint of the steering gear becomes filled with sand, until finally it becomes almost impossible to operate it. It wears rapidly under these conditions, and it is almost impossible to protect it. Clutches, if located too near the ground and imperfectly protected, soon gather grit on their frictional surfaces and upon their operating mechanisms, and wear with great rapidity.

Perhaps the chains and sprockets suffer as much from muddy conditions as do any other parts of the machine. It appears to be impossible to enclose chains effectually, and in wet weather the shaft drive appeals

very strongly to one's sense of fitness, but, of course, it is expensive to construct, and its superiority to the chain in point of efficiency has yet to be proved.

By being continually plastered with mud the efficiency of radiators may be greatly reduced, as the thermal conductivity of earth is very low in comparison with metal. Air cooled engines which are hung low and depend upon the conductivity of clean metallic surfaces for the dissipation of the heat are likely to run hot when encrusted with "adobe." Mufflers, too, may become so covered with clay as to be very much choked and produce considerable back pressure.

It is to be hoped that intending purchasers may be very conservative in regard to drawing any general conclusions respecting the relative merits of the competing machines, based upon the results of this or any other endurance test. If one were to judge that all the cars which have successfully followed the schedule are equally meritorious or that the car which now retains the largest number of points is the best for touring of this sort, the conclusion might be very hasty.

There are in the garage tonight and there will probably arrive on time in Pittsburgh ponderous gasoline cars costing \$5,000, steam touring cars, gasoline runabouts costing \$650, representatives of the typical American service car with low speed engine, and examples of cars equipped with high speed French motors and all the latest styles in bonnets and radiators. There will be water cooled motors and air cooled motors, and indeed cars of almost every type. It is going to be very bewildering to the intending purchaser when he sees the records (if indeed he ever does) to draw any helpful conclusions from the run. The problem of determining the value of a machine under endurance contest conditions is made difficult, because it is necessarily and inextricably complicated by two factors: The qualities of the operators and the individual peculiarities or defects of the particular machine or machines entered, as distinguished from the general characteristics of the average product of that particular manufacturer. A good operator may successfully "pull through" a machine with which an inferior chauffeur might make a disgraceful exhibition, or which might be practically useless in the hands of the average user under the same conditions, and of course the converse is also true. I suspect this is the case in several instances in the present run.

Then, again, it may well be that the machines entered by certain manufacturers are better than the average of their output, while it may truthfully be said, on the other hand, that the very machine entered by a maker may carry a hidden defect that does not exist in another machine of the season's product. If twenty machines were entered by each maker, these unknown factors might safely be regarded as eliminated

and general conclusions as to their mechanical merit might be warranted, but not otherwise. I believe that there are instances of machines in the run some of which are making relatively better showings and some of them worse than would be made in actual practice.

One matter which deserves more than a passing notice for the light it throws upon the esteem in which the automobile is held by the general public is the reception which was accorded us along the route.

In and near New York city the Endurance Run of the N. A. A. M. occasioned no perceptible ripple of excitement, but outside of this somewhat blasé district it has been an occasion of general interest. In the villages along the route, when weather permitted, people have been lined up at the important turns and have greeted the mud bespattered cars with cordial salutes and expressions of good will, while in almost every isolated farmhouse which we passed there has been someone on the watch to wave a hearty greeting. Quite often bouquets have been prepared by fair automobile enthusiasts and have been tossed toward the cars as they flashed past. If most of these charming missiles failed to reach their marks the attention was nevertheless appreciated. The small boys have devoted themselves to throwing us apples, which came in very handy during some of the long stretches. In the towns where we stopped over night some public demonstration was generally provided in the way of music or decorations. In the "truly rural" districts the run was converted into a veritable equine academy, as all along the way were led or driven horses, taking their first view of the competing motive power. This is an especially good sign, as it shows that people have accepted the automobile as an institution which has "come to stay." I have as yet to hear an expression of ill will from anyone along the way.

Data of Competing Cars.

By ALBERT L. CLOUGH.

The technical data relative to the competing machines, as printed in the official book of the run, is very interesting, and it is the first time that such complete mechanical facts relative to these machines have been given out. The cylinder dimensions of each car are tabulated, together with its engine speed in revolutions per minute at 20 miles per hour on the high gear. The weight of each car is given, as well as considerable further interesting information.

For the convenience of the readers of THE HORSELESS AGE some computations have been made with the above data as a basis, which may be of value in facilitating a comparison of the competing vehicles among themselves.

The piston displacement per stroke has been figured for each car and is here tabulated (column C). The piston speed in feet per minute at 20 miles per hour is also

given (column D), and a column (E) has been arranged, giving the relative piston displacement at 20 miles per hour on the high gear for each car. This figure is obtained by multiplying the volume swept by the piston per stroke expressed in cubic inches by the revolutions per minute at 20 miles per hour, and is merely an arbitrary expression proportional to the volume of the charge exploded per unit of time, and hence roughly proportional to the horse power within the limits of efficiency of the different types of engines.

By dividing the quantity in this last mentioned column by the weight of its respective machine we secure a figure which is appropriately proportional to the horse power per unit of weight, or the ability of each vehicle. This data is tabulated in column F.

If all types of gasoline engine were of equal efficiency, and if all engines were equally well constructed and well run, and, in addition, the application of the power to the rear tires of each car was equally economical, the figures last mentioned might be expected to give a fair idea of the traveling ability of the cars. Of course, none of these ideal conditions are attained, but it is probable that the reader will be able to draw some conclusions as to the power allowance of these cars from the figures presented.

It is a significant fact that the term horse power does not figure in the official tables, and almost everyone will be glad that this is the case. It would appear from these data that, on the average, the product of the piston displacement in cubic inches by the revolutions per minute at 20 miles per hour, divided by the weight in pounds, is about 76.5 for the cars tabulated, or, in other words, 153 cubic inches are swept by the pistons per minute at the speed above mentioned for each pound of weight of the vehicle.

NAME.	Number of Cylinders.	Bore and Stroke	Piston (C) Displacement Cubic Inches.	R. P. M. at 20 Miles per Hour.	Weight.	Piston Speed in Feet per Min. (D).	Relative Piston Displacement per Min. at 20 miles per hour. (E).	Relative Piston Displacement per Unit of Weight. (F).
Columbia.....	4	5x5	392 7	590	3100	491 6	231,693	74 75
Toledo.....	4	4 1/4 x 5 1/4	297 9	900	2700	57 6	268,092	99 27
Toledo.....	2	4 1/4 x 5 1/4	148 9	900	1900	787 5	134,010	70 56
Stevens-Duryea.....	2 opp.	4 1/4 x 4 1/2	159 4	592	1320	444 0	94,365	71 49
Phelps.....	3	4 1/2 x 4 1/2	214 7	900	1500	675 0	193,257	128 80
Arrow.....	2	3 1/2 x 4 1/2	105 0	1900	1960	1365 6	159,500	101 80
Pierce Stanhope.....	1	3 1/2 x 4 1/2	52 5	1900	1250	1365 6	99,750	79 80
Packard Model F.....	1	6x6 1/2	183 8	625	2300	677 1	114,875	52 21
Rambler.....	1	5x6	117 8	907	1350	907 0	106,844	79 14
Fredonia.....	1	6x6 1/2	183 8	840	1700	910 0	154,392	90 82
Fredonia.....	1	6x6 1/2	153 8	700	1300	758 3	128,660	98 97
Searchmont.....	2	4 1/2 x 5	159 0	800	2900	666 6	127,232	43 87
Covert.....	1	4x4 1/2	53 4	1200	750	850 0	64,080	85 44
Knox.....	1	5x5	157 1	770	1850	1025 0	120,967	65 38
Knox Tonneau.....	2 opp.	5x7	274 9	650	2450	758 3	178,685	72 93
Franklin.....	4	3 1/4 x 3 1/4	107 8	1000	1100	541 6	107,760	97 97
Haynes-Apperson Runabout.....	2 opp.	5x5	196 3	550	1430	458 1	107,065	75 50
Haynes-Apperson Tonneau.....	2 opp.	5 1/2 x 6 1/2	281 2	420	2350	455 0	118 087	80 24
Northern.....	1	4 1/4 x 6	166 3	840	1000	840 0	89,292	89 29
Stearns.....	2 opp.	5 1/2 x 6 1/2	324 0	400	3000	416 6	129,600	43 26
Locomobile.....	4	4x5	251 3	600	2300	500 0	150,780	65 55
Holley.....	1	3 1/2 x 4	38 5	1600	880	1066 6	61,600	70 00
Springer.....	4	5x6	471 2	400	2500	400 0	188,496	75 39
Oldsmobile.....	1	4 1/2 x 6	95 43	850	920	860 0	81,115	88 16
St. Louis.....	1	5 1/2 x 6	142 5	740	1700	740 0	105,524	62 07
								Av 76.51

of my house, and the feller got out and took a lot of tools and had to lay right down under the machine and work. Gosh! it was a hot day, and the grease run down on him, and when he got through he was a sight. And then he took hold of a crank and turned it around, and, by gosh! the darn thing wouldn't go. He had to take the whole blame thing apart. He fooled around most all the afternoon, and then he come into the house and asked me if I would pull him into

town with my team. I told him I was pretty busy, but if he wanted to give me \$5 I guessed maybe I would, and he said go on and hitch up, and I pulled him in.

"Them machines can go like all thunder, but I guess, take it all together, a horse can get there about as well.

"The horses out in our country used to be pretty 'fraid of 'em, but the drivers, I reckon, were a little more 'fraid than the horses. Sometimes we meet a feller driving one of them things who ain't no hog,

A Farmer's Philosophy on the Endurance Contest.

The crowd which gathered around the garage at Bath were greatly amused by an old farmer who had seen some of the machines pass his house, and had driven in to look them over. It is unfortunate that the dialect cannot be given, as it was that type of dialect that cannot be reproduced by the ordinary spelling of the English language. He stated that "them big cars was the kind" that struck his eye all right, and he guessed them electric were a little better than the steam engine kind. Along about 2 o'clock one come along running like thunderation. It struck a heap of mud in front of his place, and, by gosh! the mud spattered up clean on his front doorstep, and turning to his companion, said: "Didn't it, Jim?" Jim said "Yes."

Continuing, he said: "Last summer one of them big machines came through from Chicago and stopped right in front



SHOWING EFFECT ON TIRE—ALSO INITIALS INSCRIBED IN MUD.

and he gets off and gives us a chance to git by, and then again there's some of them that rides by a like wildfire and don't care for nobody. We farmers don't want to be no hogs, but you can't blame us when we have our families in a wagon on narrow roads and one of 'em comes on like all creation and don't stop nor nothin'. Of course, they've got a right on the road just as we have, but they ought to be decent about it."

Then, feeling one of the tires on our automobile, he said: "Jim, them tires must be solid matter, ain't they, friend?" When informed that they were not, he ejected a large mouthful of tobacco juice and said: "I shouldn't think they could blow 'em up so hard."

Turning to a bystander he said: "I think those things have been pretty good thing for us in a way. They bring money into the towns, and these rich fellows ain't afraid to spend their money, but I don't think the State ought to spend money making the good roads; it costs a lot and don't do us farmers no good. Cash is a pretty scarce article with the farmers, and it ain't no easy job to dig it dollar by dollar out of the ground, and when we get it dug out it don't set none too good to plant it all back in a road which ain't no particular use to us."

A man near him said: "Don't you find it a better road to get over in the spring and fall?" and he replied, "Yes, a little I guess, but we farmers can get along on the roads just as they are with the working we can give 'em every year or so."

Turning to his companion he said: "Well, Jim, I reckon we better be getting on home; 'we can't do these autermobil fellers any good,' and after delivering somewhat less than a half pint of tobacco juice from his mouth at a post near him with unerring accuracy, he went away and that was the last we saw of the old garrulous, good hearted, but prejudiced tiller of the soil.

According to E. J. Cornill, of Havana, Cuba, the records of that city show 42 automobiles in use there.

Origin of the "King of the Belgians" Body.

Our French contemporary *L'Automobile* gives the following account of how the "King of the Belgians" style of automobile body originated. King Leopold had come to Paris and was visiting a well known garage and their customer retired to the to purchase an addition to his already comprehensive collection of cars. One car after another in the large repository was tried by the royal customer, but nothing would quite suit, the tonneau seats being mostly too scant for Leopold's rotund figure and the seat backs too low, so that he feared he might break his back if the car should start up with a jerk. The inspection of the cars having been terminated, the owners of the garage and their customer retired to the manager's office, where they seated themselves in the very cosy, luxuriously upholstered high back chairs which are a feature of this office. "Now," said Leopold, "this is what I call a comfortable seat; if you could make me a car with such seats it would be just the thing I want." (Liberal translation.) A telephone message was at once sent to Leon Auscher, the well known automobile body builder, requesting him to come at once if possible. He arrived shortly, was introduced to His Majesty and asked if he could build a body with seats like the office chairs. The question was answered in the affirmative, and the product of M. Auscher's "études" was the style of body which has since become so popular for touring cars.

Market for American Automobiles in Germany.

"Small automobiles or runabouts of American make, of from 6 to 10 horse power," writes U. S. Consul General Hughes, "would, I think have a good sale in this district. So far only one American company has even asked for information as to the real class of goods wanted—though fifty have sent English catalogues, which are worse than useless, as the people will not even look at them. What is wanted is

a light machine, easily worked, and not complicated, with good brake power, as it is very hilly here, and above all a machine that is not too expensive. I should advise the opening of a small depot either here or in some neighboring city where the goods can be shown and explained and where duplicate parts can be quickly and easily had. This latter is a very important matter, as German makers do not care to repair foreign (especially American) machines if they can possibly help it."

Club Notes.

The Kansas City Automobile Club, whose petition for incorporation was denied, has decided to contest the matter.

At New Orleans the automobile club is protesting against the speed limit of the new city ordinance, 8 miles an hour, and petitioning for an increase to 15 miles in the outlying districts.

The Sacramento Automobile Club has been organized at Sacramento, Cal., with the following officers: President, W. E. Lovdal; vice president, Dr. S. E. Simmons; secretary, H. G. May; treasurer, Rudolph Van Norden. Directors, the foregoing officers and Dr. G. B. Campbell.

The Automobile Club of Vermont at its recent annual meeting elected the following officers: President, Dr. L. Hazen, Burlington; first vice president, W. B. Fonda, St. Albans; second vice president, C. C. Warren, Waterbury; secretary and treasurer, W. D. Woolson, Springfield. A banquet followed, after which subjects pertaining to automobilism were discussed.

The Dayton Automobile Club will give its third race meet at the Fair Grounds on Saturday, October 24. Earl Kiser and Carl Fisher will be present with their too horse power Mohawks, and will endeavor to break the track record of 1:34 (on half mile track). Besides there will be numerous prizes to the winners.



ON THE RAILROAD NEAR HOOPER.



BRIDGE APPROACH NEAR BAINBRIDGE.



RUNNING ON RAILROAD TIES.

NEW VEHICLES AND PARTS.

The New Forty Horse Power Apperson Touring Car.

The new high powered and luxurious touring car which the Apperson Brothers Automobile Company has recently produced and which ran in the A. C. A.'s fall run to Boston and back is claimed to represent a new type among the productions of the American automobile industry, being the first six passenger, four cylinder, high powered car yet built in this country. As shown by the accompanying illustrations, the car has six individual seats, all with high backs and equally comfortable. It has a large space for carrying baggage and touring equipment, large fuel tanks and a tank for lubricating oil holding a supply sufficient for a 1,000 mile run. Compartments for carbide for lamps, spare tubes and supplies, drawers for tools and portmanteaus for rain coats are all parts of its regular equipment.

The frame is constructed of angle steel, 2x3½ inches, filled with wood, and is suspended on semi-elliptic springs in front and full elliptics in the rear, both 36 inches long. The front axle is of solid steel of square section with 1¾ inch sides. The steering pivots are of the Lemoine type. The rear axle is stationary. All the axle bearings are roller bearings. The wheels are of the wood artillery type, 36 inches in diameter, shod with 4½ inch detachable tires, and having twelve spokes each. The wheel base is 8 feet and the tread standard.

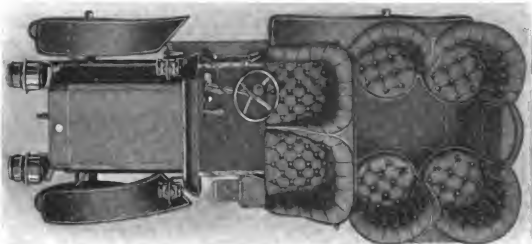
The engine is a four cylinder vertical one, said to develop 40 horse power. The cylinders are 5x6 inches and the normal engine speed is 600 revolutions per minute. All the cylinders are separate from each other and cast integral with their heads, jackets and valve chambers. The cylinders are bolted down to an aluminum crank chamber provided with heavy brackets by means of which the engine is supported on the vehicle frame. Both inlet and exhaust valves are mechanically operated, and are located at the same side of the cylinder. The ignition is by jump spark, the spark plugs being screwed into the caps over the inlet valve. The ignition current is supplied by a stor-

age battery and four coils are used, one for each cylinder. The current is distributed to the various coils in turn by a commutator, secured to the dashboard and driven from the cam shaft by means of a chain. The commutator is provided with a glass front and its operation can be observed by the driver while in the seat. The coils are also carried on the dash.

The combined water tank and radiator is

tubes by a fan, belt driven off the engine. Circulation of the cooling water is insured by a gear driven centrifugal pump.

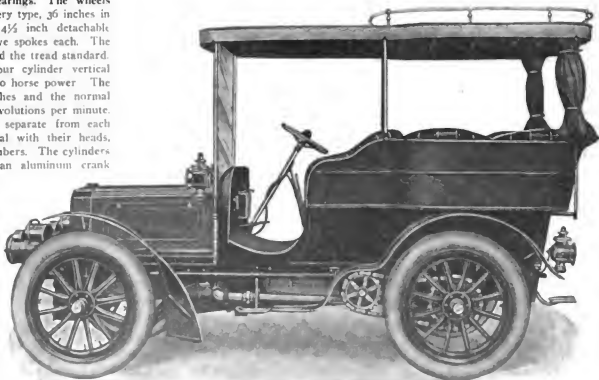
The gasoline tank is located under the forward seat and feeds the carburetor by gravity. The speed of the engine is controlled by means of a throttle valve built together with the carburetor. The engine lubrication is on the splash system, a multiple feed magazine oiler being placed at



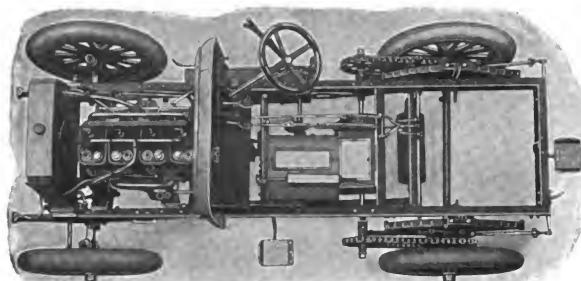
SHOWING ARRANGEMENT OF SEATS IN APPERSON TOURING CAR.

of the square front or Mercedes shape, but is constructed on quite different lines. It consists of an upper and a lower tank, which are connected together by a large number of vertically arranged, small, flanged copper tubes. The air is drawn through the spaces between these copper

the side of the cylinders, which supplies lubricant to the crank chambers of the engine and the transmission gear case. On the dashboard of the car is arranged a kerosene pump, which is in communication with each of the cylinders. By giving a stroke to this pump kerosene can be forced



APPERSON SIX PASSENGER TOURING CAR.



CHASSIS OF APPERSON TOURING CAR.

into the cylinders for the purpose of cleaning its walls of any carbon deposits which may have formed.

The clutch is of the friction band type, operating on a drum bolted to the flywheel and flexibly mounted on the gear shaft. The transmission is of the sliding gear type, giving four forward speeds and one reverse, all operated by a single lever. The transmission pinions and gears are drop forged of steel and hardened. The differential is placed on the countershaft and runs in oil. The gear box is anchored to the longitudinal frame members and transverse angle irons. All bearings of the gear case are oiled by splash and by means of ring oilers with return oil ways. The transmission to the rear wheels is by separate chains.

The car is equipped with two independent brakes, both double acting; one of these acts on the outside of the differential gear case, and is operated by foot. The other acts on drums integral with the sprockets on the rear wheels and is operated by a hand lever, the latter forming the emergency brake.

The car is equipped with large steel fenders and wind shields. It is nicely finished and upholstered, and very roomy and comfortable. The weight complete is about 3,000 pounds.

New Thirty Horse Power Daimler Touring Car.

The Daimler Manufacturing Company, of Long Island City, N. Y. has just completed the first of a lot of 30 horse power touring cars, corresponding to the well known 40 horse power Mercedes cars of the Cannstadt Daimler Company, some views of which were shown in our issue of September 30 last. It may not be generally known that the Daimler Company owns all of the American patents issued to engineers of the Cannstadt firm, but such is the case, and the German Mercedes

cars are sold in this country by M. Charley through arrangements with the Daimler Manufacturing Company, of Long Island City, every purchaser of a German Mercedes car receiving a document in which this sales agreement is referred to. Besides, the Daimler Company owns patents taken out by its own engineers, and some of its improvements, we understand, will be embodied in the next year's Cannstadt cars.

The new cars are only rated at 30 horse power, though the engines are said to develop up to 40 horse power. In general they resemble the Cannstadt Mercedes car which has already been described in our columns, but possess a number of improvements in various parts of their mechanism, to which we shall chiefly confine ourselves in this description.

THE FRAME.

The frame is of a novel construction which is said to provide great flexibility. The side beams are of channel steel and are of two parts. At the front the frame is narrower than at the rear. The forward parts of the frame beams extend to about midway between the axles and are straight; they carry the motor and change gear. The rear parts of the side beams are curved inward at their forward ends, and at their extreme forward ends are riveted to the forward parts of the beams. All the other joints of the frame are pivot or swivel joints. The forward spring horns are welded on to the frame beams. The semi-elliptic body springs are 33 inches long in front and 36 inches in the rear.

Both front and rear axles are tubular and are cranked or dropped in the centre, to admit of placing the frame very low. The wheels are of artillery pattern, 36 inches in diameter, with twelve and fourteen spokes in front and rear respectively, and shod with 4 inch pneumatics. The wheels run on roller bearings, with hollow or tubular rollers. The roller bearings comprise cages of two bronze end rings connected by a number of steel rods on which the rollers

are mounted. There are two rollers on each rod of unequal length, and the two sizes of rollers alternate as to sides; that is, on one rod the longer roller is on one side and on the next rod on the other side. Thus the rollers overlap each other, and the tendency of wearing a ridge on the surfaces on which the rollers run is avoided.

The steering pivots are located at the centre of the hubs, which reduces the reactions on the steering connections to a minimum. The latter are tubular, with ends welded on. The joints are forked, except the one

at the end of the arm connected to the worm gear sector, which is a ball and socket joint. The steering is effected by a 16 inch hand wheel of aluminum with hardwood rim, and through the usual worm and sector irreversible mechanism properly enclosed in a dust-proof casing.

THE ENGINE.

In the engine the valve chambers are placed on opposite sides of the cylinders, both sets of valves being mechanically operated. The ignition is on the spark contact principle and the current is furnished by a magneto driven by spur gears off one of the cam shafts, the magneto driving gear being arranged at the middle of this shaft. The ignition mechanism is almost the same as that shown in *THE HORSELESS AGE* of January 14 last. When the igniter rod is tripped by the cam a stop pin through it abuts against a couple of layers of soft leather riveted to the top of the cam shaft casing, so as to reduce the noise of the ignition mechanism to a minimum. Another point in which this engine differs from the Mercedes is the method of circulation connections. In the latter, as we pointed out in our issue of September 30, the pipes for both the inflow and outflow enter the jacket on top. In this engine there are eight inflow connections, at the lower end of the jacket surrounding the valve chambers. There are four outflow connections on top of the cylinders. By means of the multiple connections it is sought to insure that all of the cylinders are cooled evenly. The car is fitted with a cellular cooler built up of square tubes with crimped walls. The total water capacity is 3 gallons. To produce a strong air circulation through the cooler the engine space is closed below by means of sheet metal, the flywheel spokes are formed in the shape of fan blades, and an additional fan of small size is placed right behind the cooler and is driven by a belt from one of the cam shafts.

THE CLUTCH.

The engine clutch is of a new design. It requires only a very slight effort to disengage, and is claimed to grip very gradually and without shock. It consists really of two cone clutches and is unusually well protected against mud and dust. To the outer side of the flywheel, which is chambered out in the usual manner to receive a clutch cone, is bolted a cast iron ring which is similarly chambered out, the plane of the joint forming the larger base of the two conical frustums forming the clutch chamber. Within the chamber are placed two leather lined cones fixed to concentric sleeves. A clutch spring entirely enclosed by the outer one of the two sleeves normally forces the two clutch cones apart and into engagement with their respective female cones. The two cones can be forced together by means of a pair of cams, actuated by means of the clutch pedal, and the clutch thereby disengaged. It is, of course, evident that in this form of clutch all end thrust is taken up within the clutch itself and not at bearings.

THE TRANSMISSION.

The change gear is exactly the same as that on the 40 horse power Mercedes, comprising two sets of sliding pinions and a sliding intermediate pinion for the reverse, these three sliding parts being operated by means of three racks, with which a gear sector on the operating shaft can be brought into mesh by sliding the gear shifting lever sideways when in its central position with respect to its rocking motion. The gear is exceedingly compact, considering that it gives four forward speeds and a reverse and transmits between

30 and 40 horse power, and is located directly beneath the footboard, which facilitates inspection.

While in the Cannstadt Mercedes the bevel gear and differential are enclosed within the change gear casing, they are here located far to the rear of the change gear and enclosed in a separate casing, and two universal joints are interposed in the transmission shaft between the change gear and the differential gear, this being necessitated by the flexible nature of the frame.

The sprocket pinions are mounted on short shafts just extending through the bearings secured to the frame beams, and are brought in driving connection with the countershaft by means of flexible couplings. These latter consist of two spiders, one secured to the sprocket pinion shaft and one to the differential gear shaft, and the outer ends of the arms of one spider are connected to the outer ends of the arms of the other by several chain links each. The spider on the sprocket pinion shaft carries a brake drum. The transmission to the rear wheels is of course by separate chains. The pinions have twenty teeth and the sprocket wheels on the drivers forty.

THE BRAKES.

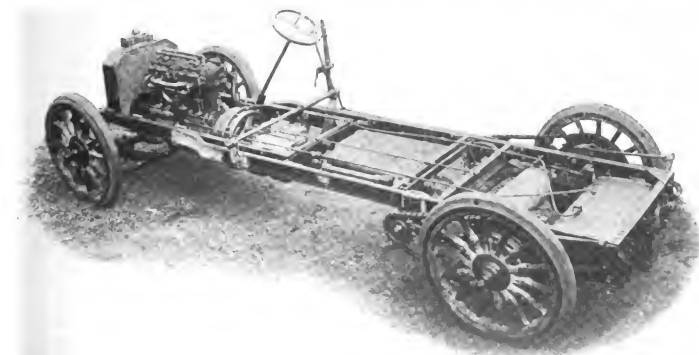
The vehicle is fitted with two pairs of double acting brakes, one a pair of band brakes which act on the drums formed integral with one member of the flexible couplings in the countershaft, and operated by means of a pedal; and the other a pair of expanding block brakes acting on the inside of drums secured to the rear wheels. These latter brakes are thoroughly enclosed, a circular sheet metal plate being fixed to the rear axle to cover the lateral

opening of the drums, and the joint being made tight by means of heavy canvas secured to the edge of the sheet and brushing against the revolving drum. These brakes are applied by the hand lever outside the seat alongside of the gear change lever.

The gasoline tank, holding 20 gallons, is placed beneath the frame in the rear. This position of the tank necessitates pressure feed to the carburetor, and this pressure is derived by shunting a part of the exhaust gases to the fuel tank, which has been a characteristic feature of the Daimler system for many years. The pipes leading to and from the tank are secured to the cross beams of the frame and are surrounded by leather sleeves at these points, to prevent injuring them.

LUBRICATION.

The lubrication system of the Cannstadt Mercedes has often been mentioned as its weakest feature, it being impossible to closely regulate the amount of oil fed to the crank chamber; and very frequently when a Mercedes car starts it produces clouds of blue oil vapor. In this car an improved lubricating system is used, the engine and transmission gear bearings being lubricated from a central oiler on the dashboard. This oiler has twelve separate oil chambers and twelve separately adjustable feeds. Ordinarily the feed is by gravity, but back of each chamber there is a plunger, and should any of the bearings receive an insufficient amount of oil it is only necessary to lift that particular plunger and force a cylinder full of oil to the bearing. The reservoir consists of an aluminum casting with a glass front, the joint between the aluminum and glass being packed



CHASSIS OF FORTY HORSE POWER DAIMLER STAGE.



FORTY HORSE POWER TEN PASSENGER DAIMLER STAGE.

with sheet fibre. The oil is led to the various oiling places through small copper tubes, and the various tubes leading to the engine bearings and cylinders are led close together and wrapped together with tape ribbon, to minimize vibration.

The body, dash and fenders are of aluminum, and the dash and fenders are provided with a rim of brass tubing which greatly stiffens them while adding little to their weight. The bonnet is removable and has the same form as the bonnet of the Cannstadt Mercedes cars.

The Daimler Manufacturing Company has recently completed a ten passenger motor stage for Ecuador, South America, to run over an 80 miles route. This stage has exactly the same motor and transmission as the touring car just described, but a very much longer wheel base. Owing to the great length of the car it appears as of very low build. It is claimed that this vehicle can

maintain a speed of 40 miles an hour on the high gear, and, as the low gear corresponds to only 5 miles an hour at normal



DURYEA CAR FOR USE IN JAPAN.

engine speed, it is a very powerful hill climber also. The vehicle is intended for public service.

improved upon, it shows the general principle of utilizing the space over the rear wheels, enlarging the foot and carrying capacity, especially in view of the two large boxes under the seats, which are much better than the usual willow baskets, as they are water tight and have locked covers. The tonneau easily carries four people, giving them ample room, and Mr. Draper thinks that something on this general principle will yet prove of considerable advantage.



DRAPER DESIGN OF TOURING CAR BODY.

Duryea Six Passenger Car.

The illustration herewith is of a six passenger park wagon built by the Duryea Power Company, Reading, Pa., to fill a Japanese order. They believe it is the largest passenger capacity vehicle for its weight yet turned out. It weighs but a little over 1,000 pounds, has the company's regular 10 to 12 horse power motor and is claimed to be a splendid riding vehicle. It is not designed for rough roads but is quite comfortable. Its low centre of gravity and long wheel base are said to insure fine riding, while it is easy for the passengers to mount and dismount.

Touring Car Body With Increased Seating Capacity.

The photo herewith shows the 1903 Winton touring car of George Otis Draper, of Hopedale, Mass., which the owner has remodeled with the aid of a local carriage builder. While this first attempt might be

Holland is one of the few civilized countries which do not grant patents for inventions, but the Government is now preparing a patent law, and its early presentation to Parliament was mentioned in the Queen's speech. Holland is a member of the union for the protection of industrial property, consisting of nearly all the principal countries of the world except Austria, Hungary, Russia, Persia, China and Turkey, and each country in the union has pledged itself to a large extent of reciprocity in connection with patents and trademarks.

COMMUNICATIONS.

The Selden Patent and Some Curious Facts.

Editor HORSELESS AGE:

The present Selden patent situation certainly gives rise to the suspicion that its owners are by no means certain of their claims that this patent controls the automobile business. Its owners, a wealthy concern, bring suit against a number of manufacturers. There are the usual sensational newspaper stories of great things to be done. Just before trial day the plaintiffs withdraw the suits, join hands with their antagonists and then together they threaten those outside of the charmed circle with infringement suits.

The original owners have wealth enough to have prosecuted that suit to a finish and if successful to have obtained heavy damages from those forty infringers. Why did they surrender? Why did they not continue the fight they had commenced? The outside is justified in thinking that the Selden patent will not stand in court and that its owners thought about the same way, and so the present queer arrangement.

There are many curious things about patents and patent suits, and there are many strange facts in literature which have rendered patents void. Those interested in enforcing the Selden patent are taking the same course as did the owners of the celebrated Gramme patent, which was supposed to control the electric dynamo, and consequently the entire electric lighting and power business. Now, what led to the downfall of the Gramme patent may in some similar way lead to the downfall of the Selden patent. At any rate the story is interesting and has never to my knowledge been published.

I happened to be at that time interested in electrical literature and had made a study of this dynamo. When the syndicate owning the Gramme patent advertised extensively their supposed rights and their threats, I looked further into the matter. The syndicate, with offices on Fourteenth street, New York, had combined the large electric light companies and proposed to close up the little concerns. It was an unlucky day for this syndicate when it selected for its first victim a little concern, Arnoux & Hochhausen, on Second avenue, New York, employing about a dozen men. A single favorable decision by the Federal court would have been all that the syndicate needed to have closed up the minor concerns.

After the suit had been brought I called at the little shop. Hochhausen was an easy going German and apparently desirous of getting along the easiest way. But it was far different with Arnoux. He was a small sized man with a nervous tempera-

ment and lots of fight. He was up in arms and I could not help thinking of David and Goliath. Time showed I was thinking rightly, for he killed Goliath.

I gave Arnoux some facts I had collected and he was much interested, urging me to call again. I saw him afterward and had more for him and found him working up a good defense. Strange facts were coming up in this controversy. Ten years before Gramme had invented his armature, which is the essential thing in a dynamo, Professor Pacinotti, of Pisa, had constructed a similar apparatus and had for several years used it in his lectures on electricity. His device was superior to Gramme's and is today the practical one.

The trial took place before Judge Blatchford and the syndicate was hopelessly beaten. An appeal to the Supreme Court was threatened and sensational articles were given the press, but nothing further was done, for there was really nothing to appeal for. All those advertisements and threats were of no avail, because that little Frenchman would not be browbeaten. But there was a still stranger fact, which, however, did not come out in the trial.

At the Crystal Palace Exhibition in New York in 1853 was an electric motor run by primary batteries. It had all the essentials of both Pacinotti's and Gramme's armatures, and this twenty years before Gramme. Remove the batteries and turn the armature by power and it becomes a dynamo. If it had been an exhibit at that trial it would have upset the Gramme patent.

And here are some more facts that have not previously been noticed: Gramme had applied for a patent on passing the electric current through wire on the field magnets. If he could have maintained even that he could have controlled the electric business. He ran up against Siemens in the English Patent Office, but both lost before a Swedish patent by Hjorth a few years before, say in 1868.

While making a search to see whether the patents on electric welding had not been somewhat antedated I found the following on page 331, volume 38, 1835, *American Journal of Science*: "Professor Emmet, of the University of Virginia, has discovered that the magnetic electric current is much increased in intensity by passing it through a portion of the generator magnet, etc." This was thirty-nine years before Gramme.

Corliss invented the automatic expansion cut-off for steam engines. It gave him a great fortune. He defeated all infringers through several suits, yet years before Corliss got up his "cut-off" an Englishman named Perkins made a similar engine, controlling the trip motion by the governor, which was the pith of Corliss's device. A search through English mechanical literature would have saved those infringers from paying heavy damages.

In the so's the sewing machine interests combined and acknowledged the validity of the Howe patents, paying him handsome

royalties. They sued infringers and closed their factories. Yet in 1793 an Englishman patented a sewing machine having the essentials of Howe's machine. Because it was indexed in the patent reports as improvements in the manufacture of leather it was not discovered. This odd indexing was because leather articles were sewed on the machine.

The numerous slot machines for vending goods would be very valuable if the slot could have been patented, but slot machines were thousands of years ago common in the Egyptian temples for dispensing holy water for a payment dropped through a slot.

A Connecticut man invented the guard pin. Millions are made. It would have been a valuable patent, but it could not be maintained, for in a case in the Metropolitan Museum of Fine Arts, New York, is a gold one from a grave in Cyprus, where it had lain for thousands of years.

In looking up the status of the Electrical Welding Company's patent 347,140, which is valuable through its royalties and which the Federal Court has upheld in the suit of the Thompson Electric Welding Company vs. Two River Manufacturing Company, I found the following, which might have modified the result if it had been presented at the trial. (The first three claims of the Thompson patent are the broad and essential ones. They call for an electrical welding process, claiming broadly such method): On page 110, Volume III, 1821, *American Journal of Science* is described Professor Hare's experiment: "A steel wire one-tenth of an inch in diameter affixed to the negative pole was passed up through the axis of an open necked inverted bell glass filled with water. A platinum wire, No. 16, attached to a positive pole being passed down to the steel wire, both were fused together, and on cooling could not be separated by manual force." This was sixty years before Thompson's invention.

After considering these various facts one is inclined to believe that the Selden patent may come under similar conditions, and that if those interested in its annulment employed a Frenchman living in Paris and a German familiar with the great German libraries to search through the mechanical literature for a dozen years or so before application for the Selden patent, there might be found a printed publication which under the rules of our patent office would annul that patent. The French and Germans were the pioneers in the automobile industry, so I selected those languages.

CLARENCE STEELING.

Tire Protectors.

Editor HORSELESS AGE:

I noticed in a recent issue of your paper some inquiries regarding tire protectors, and herewith send you a bit of my own experience and some photos of tire protectors I am using on my auto. Up here in the Allegheny Mountains we have very



CAR WITH TIRE PROTECTOR.

bad roads, very hilly and with much glass and scrap iron scattered over them. I have had much bad experience with my tires and tried hard to find a way of overcoming the difficulties. I have partly succeeded by using old bicycle tires, cutting them open along the inside and stretching them over the automobile tires, fastening them with riveted belt laces about 10 inches apart. I use Dunlop clincher tires. The laces reach to the centre of the rim, and as the tire is inflated the laces and cover are drawn tight.

I have used these protectors all last summer, on the worst kinds of roads that can be found in the country, sometimes in mud reaching nearly to the axle, and every automobilist who has seen them said, "I wish I had them on my car." They stood up well and required no attention, except replacing three laces which had pulled the rivets out of the cover.

Of course, old bicycle tires are not the proper things to use as protectors for automobile tires, but I could get nothing better, and they served my purpose well. I believe there is a chance for someone in the rubber business to place upon the market a protector of this sort, and probably some better way of fastening it can be found. The two piece rim recently described in *THE HORSELESS AGE* would be very convenient for use with such a cover, as it would be easier to get the laces under the tire.

A. TRABOLD.



TRABOLD'S TIRE PROTECTOR.

Tire Experience.

Editor HORSELESS AGE:

I would like to start a discussion in your columns relative to the size of tires. I have had four automobiles, the first one a steam carriage and the last three Oldsmobiles.

The first carriage weighed 1,400 pounds fully loaded and with passengers. This carriage was furnished me with 2½ inch solid tires. The weight of this carriage was not well distributed, the rear wheels taking more than their share. I paid out \$90 for tires for the two rear wheels in one season, while the front tires went through the season without any trouble.

I next used an Oldsmobile for one season, with the same sized tires, having to purchase only two tires. I traded my third carriage before I had a chance to use up any tires, and the carriage I have at present has been run about three months on 3 inch detachable tires.

I have adopted the practice of not blowing the tires up very hard. When not blown up so hard they flatten out considerably under the weight of the machine, thereby making a considerable surface of contact on the ground. I figure that the maximum weight the tires bear upon the ground at any point when the carriage is at rest does not exceed 15 pounds per square inch. I have been over broken glass that would have punctured the tires in my other machine. I have found tacks and nails driven partly through the tires, but have never had a puncture.

I believe tires have been very much overworked in the past. My machine has never loosened a nut or shown any of the effects of the jar from the roads which were so noticeable on my first two carriages. The large tires are noticeably easier riding. The tools in my tool box, which I used to wrap in cloth in my earlier machines to keep them from rattling, now lie loosely in the tool box and make none of the racket I used to get.

I notice that a great many of the Oldsmobiles this season are wearing the 3 inch tires, and I think a free interchange of experiences would be valuable and instructive.

S. E. DOANE.

Cleaning Autos by Compressed Air.

MINNEAPOLIS, October 14.

Editor HORSELESS AGE:

I note your editorial in the last issue on the use of compressed air for cleaning automobiles. For your information I will say that I have followed this practice to some extent and find it very satisfactory for the parts which are underneath or not easily reached. A pressure of 200 pounds is quite unnecessary; one-half of that will do the work, and even a lower pressure would perhaps be better. The higher pressure scatters the dirt and it is necessary to go over the same parts several times. Asbestos lagging suffers severely under the blast,

but when this fact is known it is easy to keep the air away from it. T. A. F.

Cushion Tires.

DENVER, Col., October 15.

Editor HORSELESS AGE:

Replying to the inquiry of M. L. F., of Oneonta, N. Y., in a recent issue of your journal, will say that I have used a set of the Fawkes indestructible airless tires on my Oldsmobile for three months, and they are easy riding, speedy, and have all the good points possessed by the pneumatic tire without its many faults, and cause no more shock or jar to the machine or occupant.

E. LINN MATTHEWSON.

DENVER, Col., October 16.

Editor HORSELESS AGE:

In regard to the inquiry of M. L. F. in a recent issue of *THE HORSELESS AGE* asking the experience of users of non-pneumatic and non-puncturable tires, will state that I have used a pair of the Fawkes indestructible airless tires on the rear wheels of my machine for two or three months, and have run them over 1,200 miles, and find they are easy riding, and so far as I can see require no more power and cause no more shock or jar to machine or occupant than the pneumatic tire.

H. H. MARTIN, M. D.

Solid Tires Give Satisfaction.

AGRICULTURAL COLLEGE, MISS., Oct. 10.

Editor HORSELESS AGE:

I notice in the issue of 7th inst. a request for data on non-puncturable tires.

I have been using for the past eighteen months a car that is fitted with 1½ inch solid rubber tires on 32 inch wooden wheels, and have no trouble whatever from this part of the carriage. My car weighs 970 pounds with tanks filled, and is equipped with a 10 horse power, horizontal opposed cylinders, gasoline engine. As to discomfort to the passengers, no car with the best pneumatic tires could give better satisfaction. Possibly this is due in a large measure to the long flexible springs and a wheel base of 76 inches. I have used this car on all varieties of country road, and the machinery has received no damage from the use of solid tires. These tires cost originally about \$10 per wheel, and are still in excellent condition.

ALBERT BARNES.

Troublesome Ignition.

Editor HORSELESS AGE:

Ignition troubles, like the poor, seem to be always with us. A statement has recently been seen, claimed to emanate from a single spark plug manufacturer, that since February last he has supplied enough sets of porcelain for his plugs to fit three to each vehicle marketed since that date. This business was an overflow in addition to the regular plug business, from which it must be assumed that each vehicle

cle used a goodly number of plugs in the course of a season. Such a state of affairs should not exist, and inventors should turn their attention to an ignition that is reliable and that can be kept going without a constant expense for things as uncertain as spark plugs.

CHAS. E. DURYEA.

The "Auto Elf."

OAKLAND, Cal., October 8.

Editor HORSELESS AGE:

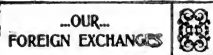
A characteristic of the auto experiences of nearly all enthusiasts is that at first they buy an inexpensive vehicle, just to learn upon and not to appear too extravagant to their closest friends. Then the auto elf appears, with all the defects of the pet machine: The axle is not strong enough; the power is not sufficient for the growing needs, and the seating capacity is too small for the family and many friends. So gradually, but surely, the desire arises for a machine more perfect "all around," and the hard pressed man then visits numberless repositories, with a view of exchanging his old machine for the needed treasure. It will cost several hundred dollars to make the change, but the arguments that it will be cheaper in the end seem so plausible that the trade is made, and the happy owner of a new car pulls the lever for a hurried run home to take the family for a ride.

Preparations have been made for a welcome at the auto shed, doors are left open and all rubbish is pushed aside preparatory for the home coming of the new machine. All have commented upon the good judgment of the possessor of so fine a machine, the old one is condemned as not at all the one to own, the friends and neighbors have said "good by," and the possessor of "the only" machine makes for the auto shed, when, to his consternation and chagrin, the door is not wide enough to admit him. Then that auto elf again appears and argues. "The shed has always been too small—build larger." And why not? Progress is the cry, so keep in line.

J. P. BONSFIELD.

We have an inquiry for the address of the writer of the communication entitled "A Wail from Mexico," from an interested party in Grand Rapids, Mich. The manuscript has been misplaced and we would ask our correspondent to send us his address.

It appears that in France fast automobiles are made use of a good deal by smugglers, and the Customs Department, recently applied to the Extra Parliamentary Commission to suggest a method by which the smugglers might be overtaken when passing the boundary. The commission suggested to dig three adjacent cross gutters across the road, 7 feet wide and 2½ feet deep, these cross gutters to be marked by white signs and red signal lanterns during the day and night, respectively.

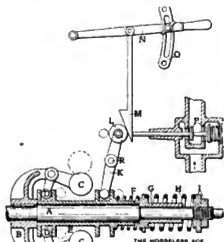


A New Type of Throttle Governor.

The latest cars of the Albion Motor Car Company, of Glasgow, Scotland, are fitted with a patented governor, the invention of T. Blackwood Murray, one of the directors of the company.

The governor is of the centrifugal type, and so arranged that at low speeds the centrifugal pull of the balls is counterbalanced by a comparatively light spring. At higher speeds the balls act against a stronger controlling spring, or a number of springs so arranged that the balls will compress them in turn at the desired speeds.

Referring to the figure A is a shaft driven directly from the motor, and to this is keyed a crosshead B, which carries two governor balls C, which are fixed to bell crank levers pivoted to the extremi-



MURRAY THROTTLE GOVERNOR.

ties of the crosshead B. The opposite extremities of the bell cranks D are mounted freely in a groove on the sleeve E, which is free to slide along the shaft A. As the shaft rotates the centrifugal pull of these balls tends to force them outward, and by so doing to rotate their respective bell cranks, and to move the sleeve E along the shaft A from left to right. Any movement of this sleeve toward the right is counteracted in the first instance by a light spring F. Upon the shaft A is another sleeve G, also free to slide upon it, its motion being limited toward the left by a shoulder on the shaft A, and toward the right by lock nuts I. When the sleeve E has moved a slight distance toward the right on the shaft A, it comes up against the second sleeve, and the centrifugal pull of the balls will tend to move this second sleeve G also toward the right, but this in its turn is forced toward the left by a strong spring H. As the spring F is a

light spring, it is evident that a comparatively moderate speed of the shaft A will suffice to generate sufficient centrifugal pull in the balls to compress this light spring, and a higher speed will cause the governor to force the sleeve E up against the sleeve G, and move the latter sleeve away from the shoulder and compress the spring H, a sufficiently high speed making it possible for the balls to force this sleeve right up against the lock nuts. K is a lever pivoted at R; one end of this runs between two collars on the sleeve E. It will therefore be evident that any motion of this sleeve along the shaft A will result in a movement of this lever about its pivot and a movement in the opposite direction of its other end. P is a throttle valve of the balanced or double beat type arranged in the inlet pipe to the motor so as to control the supply of fuel to the motor. This valve is provided with a spring which tends to close it. In the position shown in the drawing the valve is sufficiently raised to give full gas to the motor. M is a wedge shaped distance piece inserted between the roller L on the end of the lever K and the stem of the valve. It is pivoted at its upper end on a pin in the hand lever N. The motion of this hand lever downward inserts the wedge shaped distance piece between the end of the valve stem and the roller L, and lifts the valve further off its seat, which, of course, necessitates the lever K being rotated by the governor through a greater angle before the valve closes. A movement of the governor sufficient to bring the sleeve E up into contact with the sleeve G will rotate the lever sufficiently to allow the throttle valve to close. It is therefore evident that the engine will govern at the low speed, as a low speed is sufficient to compress the light spring. If, however, the hand lever N is moved downward the wedge will thereby be further inserted, and the governor will be required to move the sleeve E further to the right, and therefore also the sleeve G to the right before the valve closes. The motor will therefore govern at a much higher speed, as a higher speed of the balls is required to compress the stiffer spring. This spring may be so proportioned as to give a large variety of governing speed, the governing speed rising proportionately as the wedge is inserted by moving the hand lever downward—Autocar.

A Sketch from the English Trials.

"We started back in a helter skelter, for everybody had warmed to his work, and the heat had not evaporated in the process of lunch. At Horsham there was a fifteen minute rest, and the joy of the Horshamites in sniffing the odors of a village full of cars was ineffable. Again ensued a helter skelter, for each man swung off as he liked, and there were only two exceptions. These two collided, and the local yokel's smile increased in latitude."

Motor cycles seem to be quite popular in Germany, as may be inferred from the fact that the German Motor Cycle Association has now, after an existence of only three months, over 500 members.

Captain Deasy, the well known Central Asian explorer, on October 5 drove his 14 horse power automobile up the cog wheel mountain railway from Caux to Rochers de Naye, above Territet, on the Lake of Geneva. The captain intended to repeat this performance on October 12 before a number of journalists and sportsmen.

A series of monthly lectures and discussions on technical subjects which received only scant attention at the recent Automobile Congress will be held in the lecture hall of the Automobile Club of France's clubhouse, 6 Place de la Concorde, Paris, the coming winter. The first meeting will convene on October 23, at 8:30 p. m., and the subject will be "brakes."

The Sanyo Railway—the most important next to the Government lines in Japan—has decided to open a service of motor vehicles between Nii Station, on the Bantan line, and Kinosaki, a distance of 40 miles. The less important Hankoku Railway Company is also considering the establishment of a service of motor cars between Sanda and Arima, a mountainous road upon which it would be impossible to construct a railway of any kind except at enormous expense.

In the races at Southport, England, on October 2, Ernest Hutton, on an 80 horse power Mors, made a speed corresponding to 80½ miles per hour—on a slight down grade and with a strong wind to the rear. Running over the same course in the opposite direction his speed was only 69 miles per hour. Under similar conditions S. F. Edge's best speed on his 45 horse power Gordon Bennett Napier was 62 miles an hour. Mr. Edge did not compete in the down wind trials. Ignition troubles spoiled the Hon. C. S. Rolls' chances on his 70 horse power Mors. There was a total of 189 entries in the different events, and a mile long crowd of 10,000 people witnessed the races.

At a meeting of the Society of Engineers, held at the Royal United Service Institution, Whitehall, London, October 5, a paper was read on "Motor Transport for Goods," by Mr. Douglas Mackenzie, who suggested that, while they should specify wider tires and driving wheels of larger diameter, the speed of motor wagons should be left unrestricted, so that each size should be run at the speed that proved most economical and best suited to the traffic encountered. He urged the necessity for a better and stronger form of road wheel, and impressed on inventors the great future that lay before the internal combustion engine when it could be made to work with crude petroleum or residue



Next winter's tournament of the Florida Coast Automobile Association is scheduled to take place January 25 to February 6.

Creditors of the Searchmont Automobile Company, Trainer, Pa., recently placed in receiver's hands, have petitioned to place it into bankruptcy.

Charles F. Weld, Mansfield, Mass., is said to be the first rural mail carrier in New England to make use of an automobile in his daily rounds.

The chief of police of Milwaukee, Wis., announces that he will arrest automobilists using horns for warning signals instead of the bells which are required by law.

The opponents of a more liberal automobile law in Massachusetts are sending out circulars to the voters urging them to vote against any increase in the speed limit.

We have received the first issue of a new French weekly automobile publication, *L'Automobile—Revue des Locomotions Nouvelles*, published at 7 rue Saint Benois, Paris.

J. L. Martin, Central Automobile Exchange, Providence, has contracted for 500 Stanley steamers for delivery during season of 1904. This concern is also Providence agent for the White Sewing Machine Company.

It is reported that C. S. Rolls on October 12 lowered the world's kilometre record to 26.25 seconds at the Duke of Portland's private park in a new 110 horse power car, presumably a Mors. The timing was official.

Drs. P. H. and J. J. McGovern, Milwaukee, Wis., are suing the B. & P. Company for \$1,000 damages on the ground that an automobile sold them by defendant was not as guaranteed. Defendant denies the allegation and sets up a counter claim.

The General Electric Company is experimenting with trackless trolleys in the vicinity of its plant at Schenectady, N. Y. The first trial will be made along the State highway from Newtonville to Loudonville. The system used is patterned after the French and German systems.

The Reid Manufacturing Company, Detroit, is building a 1,500 pounds touring car with 12 horse power double opposed cylinder engine under a Mercedes style hood in front, and a bevel gear drive. The running gear will be of 3 inch angle steel and the body of the tonneau type.

Edwin O. Potter has been appointed receiver for the Chicago Motor Vehicle Company, Chicago and Harvey, Ill., manufacturer of gasoline omnibuses and delivery wagons. A petition in bankruptcy was filed against the company in the United States

District Court. The assets are estimated at \$200,000, and the liabilities at \$250,000.

El Reno, Okla. T., now has an automobile club with the following officers: R. S. Tullock, president; F. O. Gilbert, vice president; W. D. de Varney, secretary; John A. Master, treasurer; E. Humphrey, committee on roads.

Many Grand Rapids automobilists object to the clause in the new law which requires the initials of the owner to be placed on the lamps of his machine. The ordinance is deficient also in that it makes no provision for dealers testing new machines.

At the recent sale of the assets of the bankrupt General Automobile and Manufacturing Company, Cleveland, Ohio, Studebaker Brothers, of South Bend, Ind., through the Cleveland Trust Company, bid in the entire property, including real estate, machinery and manufactured parts.

About November 1 the Crest Manufacturing Company, Cambridgeport, Mass., will move into new quarters at 265 First Street, Cambridge, where they will have 40,000 square feet of floor space. They expect to turn out 1,000 cars in 1904, and will soon open a New York branch in the Thirty-eighth street district.

Dr. William T. Durrett, Louisville, Ky., is defendant in two damage suits aggregating \$15,245 for alleged injuries caused by his automobile. The doctor's license number was taken from him for "scorching" a short time ago, and he sought through the courts to compel the commissioners to restore it to him, but the court declined to interfere. Subsequently he was restored to favor on his promise to observe the law.

Thomas B. Jeffery & Co. have issued a statement, in which, after referring to the notice of infringement published by the A. L. A. M., they say: "We desire to assure all purchasers or users of the Rambler automobile that it is not constructed in the manner described in the Selden patent, No. 549,160, nor in a manner described in any patent not owned by ourselves; that we are amply responsible and will defend to the utmost any action for infringement brought by the Association of Licensed Automobile Manufacturers against users of the Rambler automobile in any part of the United States."

The Locomobile Company of America report the following recent sales of their gasoline touring cars: S. P. Hulst, Philadelphia, Pa.; Theo. Kearney, Fresno, Cal.; E. N. Russell, Middletown, Conn.; E. N. Hubbard, Middletown, N. Y.; W. D. Barnes, Auburn, N. Y.; E. D. Achenbach, Hamburg, Germany; M. D. Hutches, Orlando, Fla.; J. C. Murphy, Greensburg, Pa.; W. A. Gabler, Long Hill, Conn.; E. F. Griffith, Orville, Ohio; E. W. Dolph, Providence, R. I.; Fred T. Joy, Danbury, Conn.; Frank W. Bolande, Bridgeport, Conn.; A. D. Somers, Bridgeport, Conn., and Phoenix Silverware Company, Phoenix, Ariz.

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...EVERY WEDNESDAY...

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Motor
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One week's notice required for change of advertisements.

Address all communications and make all checks, drafts and money orders payable to THE HORSELESS AGE, 147 Nassau Street, New York.

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New Selden Patent Infringement Suit.

Suit was filed last week in the United States Circuit Court of the Southern District of New York by the Electric Vehicle Company, of Hartford, Conn., owners of the Selden patent, against C. A. Duerr & Co., of New York city, agents for the Ford Motor Company, of Detroit, and the Ford Motor Company for alleged infringement of the Selden patent by defendants. Although the suit is brought by the Electric Vehicle Company, it will be fought by the Association of Licensed Automobile Manufacturers, the association having set aside a certain portion of its income for the enforcement and defense of the patents owned by its members.

As stated in THE HORSELESS AGE some weeks ago, the institution of this suit was inevitable, and it was only a question of time. The association apparently pursued the policy of diplomacy in securing recognition of the validity of the Selden patent to the very last, for rumors were rife to the effect that an important concern outside the fold was about to institute suit against the association for alleged intimidation of its agents. On the other hand, a prominent member of the association, located also in Detroit, is reported to have threatened to withdraw from it unless proceedings were instituted at once against the manufacturer who is made defendant in the present suit. Detroit has been the storm centre of the Selden patent contention so far, a considerable number of the most important members of the association being located there, as well as several of the foremost unlicensed makers.

Now that the fight has begun we believe we voice the sentiment of the entire body of automobile users in this country and of the greater number of agents and manufacturers, both licensed and unlicensed, in

saying that it is to be hoped that the fight will be short and decisive and that it will be settled once for all whether George B. Selden actually made a new and useful improvement in means of road locomotion of such scope as to entitle him under the law to the tribute of the entire gasoline automobile industry, or whether the patent was unjustly granted or does not cover the the modern gasoline road vehicle. The present suit is the sixth brought under the Selden patent. All the preceding ones have been settled out of court and the validity of the patent has never yet been passed upon by a court. There is, of course, a possibility of the present suit also being settled out of court, which would leave the situation exactly the same as it is today, except for the additional strength of the association; but the previous attitude of the defendants in this suit makes this rather unlikely. The developments in this suit will certainly be watched with the keenest interest by the whole automobile world.

Another Business Vehicle Competition.

The suggestion to hold another business vehicle contest the coming winter, made to the Automobile Club of America by Arthur Herschmann, has met a favorable reception, and the contest committee of the club has decided to hold the contest during the month of February next. No details have as yet been decided on, however.

It is to be presumed that the chief object of the coming contest is to determine to what degree business vehicles of the different makes and motive powers are affected by the low temperatures prevailing during the winter months and by the occasionally very slippery condition of the streets at this time of the year. Two of the problems connected with this branch of motor vehicle design that are still only

partially solved are those relating to the freezing up of the pipes in steam vehicles in cold weather and the securing of sufficient traction with steel tired vehicles when the streets are snow covered or greasy. In February the weather is generally very changeable, and the success of the contest is therefore to a certain degree a matter of chance.

In addition to observing the running qualities of the vehicles under conditions of winter weather, records will presumably be taken again of the fuel and water consumption, and in that case it is extremely desirable that better arrangements be provided for measuring these supplies at the start and finish than in the contest last spring. A water meter registering in cubic feet is entirely unsuitable for this purpose, and a good sensitive scale would serve the purpose much better. The rough and careless method of measuring the supplies was really the weakest point of the contest last spring, and it is to be hoped that it will be improved upon in the coming contest.

That Anti-Speed Congress Again.

A few weeks ago we referred to a proposal, emanating from the German Automobile Club, that an international convention be called to devise ways and means for checking reckless driving. It appears that no official statement of the proposal was issued by the club to the press, but that the press reports were based upon verbal communications, with the result that the different accounts are considerably at variance with each other, and some very inappropriate criticism has been passed upon the proposal, notably in France. One French contemporary is under the impression that the idea is to limit the speed of racing cars to a definite maximum, and naturally disapproves of it, for there can be no speed contests, properly speaking, when the cars are not allowed to surpass a certain speed. Our contemporary thinks that the move is a parallel to that of the mayor of Vanves, who ordained that vehicles running at the same speed must not pass one another. It has also been suggested that possibly the Germans, now that they are holding the Gordon Bennett Cup, wish to abolish racing, so they may be spared the vexation of seeing that trophy wrested from them, but to this it is replied by the club that it is not intended to modify the Gordon Bennett race rules in any way for next year.

The actual reasons which led to the propo-

posal of calling an international congress to consider the subject of racing are about as follows: At present practically all efforts of the organizations which count among their objects the advancement of the art of automobile construction are directed toward the organization of races. The only class of vehicles which show to advantage in these races are the so called "monsters"—heavy machines of enormously high power. These vehicles are of no practical use on the road. Hence the only result of the efforts of the clubs is the construction of freaks, while those who set themselves the task of producing a purely service vehicle receive absolutely no encouragement. This matter was brought up at the last annual meeting of the German Automobile Association, and the association was asked to issue rules for service vehicle competitions, in addition to its racing rules. This was shortly after the Gordon Bennett race had been won by the German team in Ireland, and the intoxication of victory had evidently not yet subsided, for the proposition was promptly tabled. Those representing the service vehicle interests did not relax their efforts, however, and the outcome has been that an international convention will be called.

The real purpose of the convention will, therefore, not be to fix a limit for the speeds attained in races, but rather to devise ways and means for giving encouragement to service vehicles instead of to the production of freaks and speed record breakers.

Electric Touring.

During the past year most of the larger manufacturers of electric vehicles have brought out a touring car type, resembling in appearance gasoline touring cars, having the tonneau body, front compartment giving bonnet effect, wheel steering, long wheel base, etc. It was to be expected that some manufacturer would undertake to make a demonstration of the touring capabilities of this type of car, and this was done about a week ago, when the New York representative of one of these manufacturers made a successful trip from Boston to New York, with four persons aboard the whole distance, as related elsewhere in this issue.

It has thus been demonstrated that touring in electric carriages is quite possible in this section of the country. During the trip the battery was recharged only four times, in the larger cities passed through, while there are charging facilities to be

found also in many of the smaller towns. Another trip of considerable length that can be made in an electric touring car is from New York to Philadelphia. Probably New York to Albany would also be possible, although this route comprises many severe grades.

The average speed which can be made with an electric car is naturally lower than that usually made with gasoline or steam cars, but most owners of electric cars are not particularly fond of high speeds, and would be perfectly satisfied with an average daily mileage of 50 to 60.

Endurance Contests in France.

In a recent interview someone made the remark that "they don't have endurance contests in France," which was evidently intended as derogatory to this form of contests. However, not all good things in the automobile line originated in France, and the endurance contest is one of those that did not. But while the French cannot claim the credit of having originated this form of competition, they are rapidly gaining in appreciation of its merits, and the signs are that the most important event in France next season will be one in which speed will not be the basis of competition.

A French contemporary, *La France Automobile*, is organizing an endurance contest from Paris to Rome, to be held next March, and has recently made public the rules which will govern this contest. Following the example set in the rules of the recent New York-Pittsburg contest, the speed made will have no effect upon the classing, as long as it is within certain limits. The various factors on which points will be given are as follows: Useful load carried, price of chassis, fuel consumption, speed on a measured-off stretch, brake efficiency, minimum radius in which the car can turn, comfort and arrival at controls. There will be no official observers and no record of mishaps and delays en route, and hence the contest will be of a somewhat primitive order, similar to the 1901 contest of the A. C. A.

A peculiarity of this contest will be that only points against a vehicle will be counted, so that the car having the least number of aggregate points will be the winner. The entries will be divided according to cylinder capacity into four classes, with cylinder volumes of up to 122 cubic inches, between 122 and 305 cubic inches, between 305 and 427 cubic inches, and above 427 cubic inches respectively.

Some Conclusions from the Contest.

By ALBERT L. CLOUGH.

To anyone who has followed the performance of the cars in the great automobile event just closed one thing, it seems to me, must be strikingly evident—that there has been an immense advance in the standard of excellence since earlier automobile tests. While it cannot be said that the improvements in this year's cars include anything of a radical or revolutionary character, the progress has been more along the line of a careful working out, in the light of experience, of designs to which the manufacturers had already committed themselves. This is substantial development and sure to bear good fruit for the enjoyment of future users. The careful perfection of any of the reputable makes of American automobiles may be expected to produce a product possessing real practical value.

An endurance run is expected to throw some light upon the relative advantages of the different types of automobile construction—the touring car and the runabout; vertical engine in front and horizontal motor equipment; heavy and light weight; air and water cooling, and many other mooted points. However, it is only under certain conditions that it is safe to draw general conclusions respecting these constructive differences. There must be a large number of competing cars in order to generalize safely; the effect of the personal equation of the operator must enter as little as possible; there must be the fullest publicity given to the performance of each car and the conditions of the test must be as nearly normal as possible.

In the New York-Pittsburg test none of these conditions have been perfectly realized. Thirty-four vehicles are too few upon which to base any very safe conclusions. The number is less than half of the competing cars in last year's very successful run from New York to Boston and return, which was managed by the Automobile Club of America. In the

present test the endurance of the operators complicates to a remarkable degree the apparent endurance of the machines, and will tend to vitiate all conclusions which might otherwise be drawn. On the second day of the run an operator who was willing to take chances as to his health and to work in the rain and drive at his imminent peril over strange roads in pitchy darkness might very likely have saved the reputation of his machine and demonstrated all its possible endurance, while another man might have thought that no such unheard-of efforts were demanded of him, and, being a little less strenuous of nature, might have pushed the machine into a barn and regarded further progress as hopeless where the first man would have pulled through by his grit and fertility in expedients.

Full data not being at present attainable, it is impossible to draw any complete conclusions on technical points. If the full operators' records are ever given to the public in an unexpurgated condition, something perhaps may then be said upon them.

Of course it is possible to make a few tentative remarks based upon what little data have escaped the censorship, but they are worthy of little serious attention. One thing is certain: the public has thus far gained less satisfactory technical enlightenment from the present test than from any other which has been run.

If a weight of 1,550 pounds is taken as the dividing line between "heavy" and "light" vehicles, it will be found that just one-half of the cars which actually started will fall in each class. Of the 17 light vehicles, 7 reached Binghamton within the schedule and 9 arrived in Pittsburg. Of the 17 heavy cars, 10 reached Binghamton and 12 reached Pittsburg within the time limits. In each case a larger proportion of the heavy cars arriving may go to show that they, as a class, possess a fuller degree of endurance. The average weight of all cars starting was about 1,685 pounds.

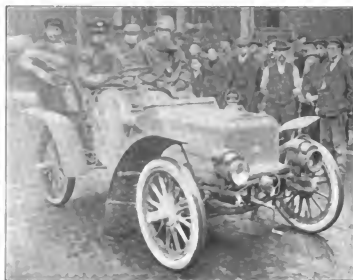
Of the 31 gasoline cars which started, 11 employ a vertical motor in front and follow conventional foreign practice, while 20 make use of a horizontal motor in the rear or centre of the body (exceptions being noted in the case of the Haynes-Apperson tonneau and Pierce Stanhope, these two, however, being more of the American type than the French).

Out of the 11 cars of the French type, 5, or about 45 per cent., reached Binghamton, and 7, or about 64 per cent., reached Pittsburg within the schedule. Of the cars which I class as of the American type, 9, or about 45 per cent., reached Binghamton, and 12, or 60 per cent., reached Pittsburg, which, considering the fact that a large proportion of the American type cars were avowedly runabouts, does not show the marked superiority in endurance which the French type might have been expected to demonstrate in such wet weather.

Among the cars which started, 12 may be classed as touring cars and 22 as runabouts, although it is not possible to draw the line definitely between the two classes.

Nine, or 75 per cent., of the touring cars arrived in Binghamton, and 8, or 66 per cent., officially arrived in Pittsburg, while 8, or 36 per cent., of the runabouts reached Binghamton, and 13, or 59 per cent., made Pittsburg within the time limit. This might be construed as showing that the high powered touring cars enjoy a real superiority in endurance during such a day as Thursday, the 8th, and, indeed, throughout such a test perhaps, but it is interesting to notice that the runabouts did splendid work in catching up with the touring vehicles when the roads began to dry off.

If any one class of vehicles is to secure the honors in a test where every successful machine and operator deserve commendation, I believe that our admiration is due to the plucky runabouts and their gritty chauffeurs, for they have demonstrated extreme endurance in man and machine. Yet it is to be hoped that intending pur-



THE TWO PIERCE CARS ENTERED IN THE RECENT ENDURANCE CONTEST AT BUFFALO.

chasers may not misinterpret this courageous piece of work on the part of the little vehicles as a proof that they can secure for \$700 as good a touring vehicle as \$2,500 or \$5,000 will buy, either in point of comfort, carrying capacity, speed or durability.

Extremely wet weather has always been held by the detractors of gasoline cars to be a condition which would put most of them "out of business" by interfering with the ignition, particularly in motors of the low hung American type. The people that ever thought much about the subject knew better, and were confident that a gasoline motor could be made fully as independent of weather conditions as a steam engine. If the wires of a 30,000 volt transmission can be safely insulated, it ought to be possible to hold the relatively low sparking voltage. Such proved, in general, to be the case in the last run, and although minor ignition troubles may figure quite largely in the observers' records, it can hardly be gainsaid that the test disproved the vulnerability of the gasoline car to wet weather, which had been claimed against it. Sparking apparatus is gradually receiving the attention it deserves, is being better placed in the cars, and its connections are being made with a regard to the best electrical practice as respects insulation and conductivity.

At the controls I heard no such disgusting exhibitions of muffler explosions (the sure indication of faulty ignition) as have characterized previous runs, and I did not happen to see any vehicles on the road which were skipping spark, although there were undoubtedly some troubled in this way.

The test was one exceptionally fitted by its extravagant conditions to bring out weaknesses in running gears. There were some axles broken and springs fractured, but not an unexpected number, and most of the axles succumbed to abnormal rather than legitimate strains, such as skidding into obstacles and furious driving.

I fancy that the number of constitutional weaknesses developed in this test were fewer than ever before, considering the conditions. They will continue to be fewer and fewer in each successive test as long as progress continues.

If air cooled motors did not cover themselves with glory on this trip, they certainly covered their radiating surfaces with mud; and this fact undoubtedly accounts for some of the misfortunes of one of the air cooled types. The other form of air cooler is said to have suffered from overheating during the long stretches of low gear work to which it was subjected, and also from exhaust valve troubles—which are likely to be particularly acute in machines not provided with water circulation. I do not believe that air cooling as a principle ought to suffer in popular regard on account of the results of this test, for it must be remembered that this method is in its early stage of develop-

ment and has not been worked out to the degree of refinement attained in water cooling systems. Air cooling must, I think, be counted on in an increasing degree in the future of the industry, as it is a step toward that ideal of simplicity after which all farsighted builders are striving in order to produce a vehicle suitable to the use of all kinds of people in all kinds of weather.

It was somewhat disappointing to note that no two cycle motor was entered in the contest. One may count it strange indeed if, in the next test of this kind, two cycle engines do not figure—perhaps air cooled ones, too.

The tendency toward the use of double tube tires seems to have carried everything before it. The single tube tire was represented upon one lonely car, which soon withdrew from the run, and the double tube was universal beyond Pine Hill. The fact that, although more expensive, double tube tires were used even on the lightest and cheapest runabouts speaks eloquently as to the regard in which the clincher tire is held and as to the completeness with which the "hose-pipe" has passed away.

Considering the severity of road conditions, I fancy the official records will show that the tire troubles were rather less than might have been expected in so long a run, judging from past experience in endurance contests. If even tires are actually beginning to improve, the automobile millennium may be nigh. One batch of bad tires bothered the cars of one of the most worthy manufacturers in the earlier part of the run, but they were soon eliminated.

This is the first endurance run in which steam cars have not comprised a goodly portion of the entries. In this test but one manufacturer stood as the representative of this somewhat depopularized motive power. Their cars, however, made splendid records, such as to entitle them to the confidence of the large body of prospective users who feel that they prefer steam rather than gasoline.

There were two makers entering vehicles in this contest who are not members of the Licensed Association, and it was noticed that gasoline still explodes with full vigor in unlicensed cylinders. Most fairminded people were, I think, pleased to see these vehicles at Pittsburg.

The rule forbidding the cutting out of mufflers was generally obeyed, which has never been the case in previous contests, and, while this provision may have deterred one or two well known manufacturers from entering cars, it undoubtedly tended to impress the communities along the way that gasoline vehicles may be operated quietly and yet show adequate power.

Racing has always characterized previous endurance runs, and it was by no means absent in the one just past, and still I think the operators, on the whole,

were inclined toward careful and considerate driving. Some of the big cars are reported to have figured in some lively brushers, and certain of the manufacturers showed a rather childish desire to be first into their home towns, upon the arrival at which they were favored with highly colored write-ups in the local yellow journals.

There was a rule against receiving renewal parts from the factory to use in replacing broken portions of the competing vehicles, and there were a good many infractions of this provision; but still some attention was paid to the spirit of this regulation, and there was no such "reconstruction policy" in evidence on this run as was a feature of the New York-Rochester and even later runs.

Every car which pulled through deserves lasting credit. This is the main thing to be said upon this test, and I hope that every one of them will get good advertising as a result of their hard work and the good money that they have paid out; but that there has been any public enlightenment arising from this test I seriously doubt.

The Air Cooled Machines in the Endurance Contest.

By J. G. PERRIN.

During the storm on the second day of the recent contest it became apparent that the provisions for cooling in many machines were inadequate for the unusual conditions. Some of the water jacketed engines showed a diminution in power owing to overheating, but this trouble was naturally more common among the air cooled motors.

No air cooled motor built will stand the test of running almost continually on the low gear (car speed low, engine speed high) without marked loss of power, if not actual sticking of the piston. This loss may be due to several causes: The cylinder explosion chamber receives only a partial charge, owing to the latter being in a state of expansion; the valves or seats may be distorted enough to prevent proper seating; increased friction may be caused by the burning of the film of oil which should always be present between the surfaces of bearing parts, not to mention ignition trouble, which, if present at all, would likely cause complete stoppage.

According to an English writer, who some time ago made a series of tests on an air cooled motor under conditions making the cooling facilities inadequate, and running at steady high speeds, at the end of the first minute the brake horsepower was 2.33; at the end of the fifth minute, 2.11, and at the end of the tenth minute it had decreased to 2.01 brake horse power.

At the Empire City track at Yonkers, on one of the hottest days in July, observers admired the performance of an air cooled engine driving a light car for 5

miles as steadily as clockwork. However, in the 10 mile contest on the same day this car consumed 8 minutes 25 seconds in the last five miles, while the first five were run in 7.25, a falling off of one minute for the second half of the trial. The water cooled engines, on the other hand, ran as powerfully at the end as at the beginning of 15 mile contests.

In such speed contests the air cooled motor shows to its best advantage, on account of the high car speed. For such traveling as that between Pine Hill to Binghamton in the Endurance Contest special measures are needed, such as increased radiating surface of the air cooled portion of the cylinder and combustion chamber; forced air circulation, or the addition of a third speed ahead to bridge the gap between the hill climbing gear and the high speed.

The addition of a third speed forward is almost prohibitory in a low priced and low powered car, as the ordinary planetary change gear does not lend itself well to the employment of more than two changes forward. But it is certainly a very desirable feature of any car of more than 10 horse power. If the speed ratio of the intermediate gear is properly proportioned, the lowest gear need be used only for starting up and overcoming grades of about 14 per cent., thus saving much overheating and wear and tear of engine and transmission. The writer is sure that two of the larger air cooled entries would have fared much better had they incorporated this device in the recent endurance test.*

Tire Practice.

Among the cars which started in the Endurance Contest eleven were fitted with 4 inch tires. The total weight with passengers of the heaviest of these eleven cars was 4,237 pounds; of the lightest, 2,210 pounds, and the average weight was 3,105 pounds. For the other sizes of tires the corresponding figures are as follows:

Three cars with 3½ inch tires—Highest weight of car with load, 2,725 pounds; lowest, 2,312 pounds; average, 2,542 pounds.

Fourteen cars with 3 inch tires—Highest weight, 2,230 pounds; lowest, 1,400 pounds; average, 1,707 pounds.

Four cars with 2½ inch tires—Highest weight, 1,300 pounds; lowest, 1,190 pounds; average, 1,264 pounds.

* Probably all the cars in the contest which had only two forward gears would have done much better the second and third day if they had been equipped with a third intermediate gear, but this does not justify the conclusion that a third gear would offer substantial advantages in ordinary running. The manner in which all the air cooled machines in the contest made up time after the storm and flood were passed through shows that the actual cooling facilities of these cars and their two speed gears are quite adequate for ordinary touring conditions, which, of course, must determine the design of cars.—Ed.

Some Features of the Fredonia Cars in the Run.

New ideas and designs were on the whole very rare in the vehicles in the endurance contest, as most of the cars were

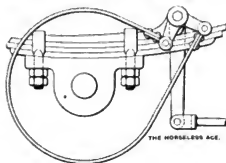


FIG. 1.

entered by long established manufacturers. A few deviations from customary practice were observed, however, in one of the Fredonia cars. Fig. 1 herewith is a sketch of the hub brake on this car. The brake is of the double acting band type, with the two ends of the band hinged to the two arms, respectively, of a bell crank. This bell crank is secured to a shaft which has a bearing in a bracket held in place by the clips which secure the body springs to the rear axle bearing. At the opposite end of this shaft, inside the body spring, is secured a rather long lever arm projecting vertically downward, from which connection is made to the brake operating device.

This car is provided with full elliptic springs both in front and rear, which calls for some way of steadying the front gear. Some cars with full elliptic springs in front make use of distance rods similar to the chain struts, but in this car the prob-

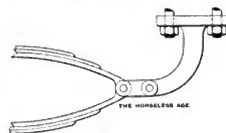


FIG. 2.

lem is solved differently, as shown in the sketch, Fig. 2. A bracket, very similar to those used in connection with semi-elliptic springs, depends from the body frame and is connected with the spring bolt by a pair of shackles.

The Brown-Lipe steering and differential gears were used on both, and are said by the Fredonia Manufacturing Company to have given perfect satisfaction during the run.

During the summer of 1903 3,400 automobiles passed the Austrian frontier in Tyrol, according to a report. Most of these were tourist vehicles from France.

Book Reviews.

The Gas Engine: A Treatise on the Internal Combustion Engine Using Gas, Gasoline, Kerosene or other Hydro-Carbon as Source of Energy.—By Frederick Remson Hutton, E. M., Ph. D., Professor of Mechanical Engineering in Columbia University. Published by John Wiley & Sons, New York. Price, \$5.

Professor Hutton's work on the gas engine is in the main theoretical and seems to be intended for students. It does not go into the design of such engines, and the greater part of it is much too abstruse for the average gas engine operator. The long historical chapters which are a feature of most European works on the gas engine are here omitted, and the author has relegated the records of past achievements in this line to a few pages near the end of his book.

In the first several chapters the different fuels used in explosion engines are dealt with, and particular attention is paid to the fuels which have only recently come into use for this purpose, such as blast furnace gas, kerosene, alcohol and acetylene. Methods are described in these chapters for making tests of the fuels and of the products of combustion. The different cycles in practical use, as well as some of historical interest only, are described. Two brief chapters are devoted to engines using gas and kerosene, respectively, as fuel, and a few characteristic examples of each type are illustrated and briefly described.

Chapter VII treats of automobile (gasoline) engines, and the succeeding chapters deal with the accessories of such engines—carburetors, igniters, governors, mufflers, etc. After a chapter on the manipulation of gas engines and another on engine tests, the more theoretical part of the work, of a highly mathematical character, begins and covers over a hundred pages.

Diseases of a Gasoline Automobile and How to Cure Them.—By A. L. Dyke and G. P. Dorris. Published by the A. L. Dyke Automobile Supply Company, 2108 Olive street, St. Louis.

This book is compiled mostly from periodical automobile literature. It contains a considerable amount of useful matter, which is not arranged very systematically, however. The book is illustrated with a large number of cuts, practically all from trade catalogues. It contains over 200 pages of reading matter, and is bound in cloth. Its price is \$1.50.

The Oldsmobiles in the recent endurance contest were equipped with artillery wheels, and it is presumed that these wheels will be a feature of the regular model next season.

Faure Type Accumulators.

(Abstract from a paper by M. Levasseur, read before the Second International Automobile Congress.)

The scope of this paper is limited to the so called "light" type of accumulators with pasted plates, which type is used almost exclusively in automobiles.

SPECIFIC CAPACITY AND DISCHARGE RATE.

As a standard of comparison we will take one of the types of accumulators used by the Compagnie Française de Voitures Electromobiles, for vehicles weighing 5,720 pounds in running order, with five passengers. This accumulator consists of forty-four cells, weighing about 33 pounds each, making a total weight of 1,452 pounds—say, in round figures, 1,500 pounds. These cells have a capacity of 180 ampere hours at a discharge rate of 40 amperes (four and one-half hours' discharge). The voltage drops during the discharge from 86 to 75 volts, but lies between 84 and 82 volts for nearly the entire period. There will be no appreciable error in assuming the average discharge pressure to be 82 volts, which would give $82 \times 180 = 14,760$ kilowatt-hours. The specific weight of the battery is, therefore, $1,500 \div 14,760 =$ practically 100 pounds per kilowatt hour. When the capacity has fallen below 135 ampere hours the battery is discarded. The capacity in kilowatt hours is then $135 \times 82 = 11,170$, and the specific capacity 1 kilowatt hour per 132 pounds. The average specific capacity, therefore, figures to 1 kilowatt hour per 116 pounds. Identical results are obtained by the Compagnie l'Electrique, but as the batteries which this company employs are lighter in proportion to the weight of vehicle complete, the durability of the plates is not as great.

The specific capacity has increased during the last three years from 1 kilowatt hour per 140 pounds to 1 kilowatt hour per 116 pounds, an increase of nearly 20 per cent., which is quite appreciable. The specific capacity varies, however, largely with the rate of discharge. The results which have been given correspond to an average rate. Numerous experiments have shown that if the battery is discharged at 20 amperes, or one-half its normal rate, all other things being equal, the capacity increases about 20 per cent. This raises the specific capacity from 1 kilowatt hour per 116 pounds to 1 kilowatt per 100 pounds.

The author was told by M. Leniau that frequently batteries which are identical as far as external appearance goes are affected quite differently by a change in the rate of discharge. Some comparisons given in another part of this article lead to the conclusion that the "sensitivity of the plate to the rate of discharge diminishes as the meshes of the grid are smaller. This phenomenon is readily explained, as grids with very fine openings approach in form plates with solid core. However this may be, the author is firmly convinced that the greatest practical progress in storage batteries may be realized by seeking to develop batteries which are as little affected

by a change in the rate of discharge as possible.

At present batteries are almost always charged at slow rates, the reason being that pasted lead plate accumulators are used almost exclusively. The usual charging rate for 22 pound cells is 20 amperes at the beginning of the charge, which is reduced to 5 amperes toward the end. M. Ducasse charges his batteries at the rate of 30 amperes, and with this rate obtains a current efficiency of 65 per cent., and a power efficiency of 52 per cent. These efficiency factors are rather unsatisfactory, the reason of the low efficiency being the fact that the batteries are too light for the weight of vehicles, being less than 30 per cent. of the vehicle complete. In the case of the second vehicle referred to above, the current efficiency reaches 80 per cent., and the power efficiency 60.5 per cent. In this case the battery weight constitutes a larger proportion of the weight of vehicle complete. Some discharge experiments were made with the same vehicle, with a discharge rate of 20 amperes—experiments which very nearly realize the conditions of the hypothetical vehicle, in which the frame and body weigh the same as the battery. In these experiments a current efficiency of 87 per cent. was obtained, and a power efficiency of 70 per cent. These various examples show very plainly the important bearing of the rate of discharge, or, what amounts to the same thing, the ratio of weight of battery to weight of vehicle, a ratio which, unfortunately, is still nearly always too small.

Variations in the rate of charge do not seem to have as great an effect upon the efficiency as variations in the rate of discharge, but too rapid charging also appreciably diminishes the life of the battery. A very important point is that the charging current is always well proportioned to the momentary state of charge of the battery, and that, while insuring complete charge, overcharges are avoided. The sole effect of overcharges is to boil the electrolyte, to cause the separators to warp and to deteriorate the electrodes.

Rapid charging being practically out of the question, if a vehicle is to be used nearly continuously, provisions must be made to rapidly replace the battery, which is a problem for the vehicle manufacturers to solve. Unfortunately, they seem not to have paid much attention to it. The best solution of the problem at present seems to be the so called under-slung arrangement of the battery, in cases suspended from the body. Unfortunately, this arrangement gives a heavy and clumsy appearance to the vehicle, and seems to be disappearing. Battery spaces which are accessible only from above are objectionable. The battery cases should be accessible through a lateral opening, and be provided with rollers to facilitate removing and replacing the trays. This arrangement would be a valuable improvement, not only from the standpoint of convenience

in charging but particularly because it would lead to better maintenance of the cells.

LIFE OF BATTERIES AND POSITIVE PLATES.

Referring again to the battery mentioned in the beginning of this article, which weighed 1,450 pounds, and propelled a vehicle weighing 5,720 pounds complete, the battery weight being 20 per cent. of the total—experience has shown that after an average of 100 discharges the capacity of the cells falls to 135 ampere hours, a loss of 25 per cent. A set of negative plates may outlast two sets of positives, but after a renewal of the positives the battery seldom regains its original capacity. The number of charges which the battery will sustain with the second set of positive plates is less than with the first set, and the capacity drops still more for the third set. The figure of 100 discharges, given above, represents the average life of the batteries. However, with the light battery of the Compagnie l'Electrique the average of the discharges sustained by the positive plates does not seem to exceed eighty to ninety (battery too light for the vehicle). The figure of seventy discharges given in 1900 is at present considerably exceeded, however, there having been a gain of about 42 per cent. This latter figure should be taken only for what it is worth, as the ratio of weight of battery to weight of vehicle, as well as the service which the car performs, has a great influence on the duration of the plates.

Public service vehicles are subjected to much harder use than the vehicles of private owners. In the use of the latter type of vehicles, there are a number of conditions which tend to prolong the life of the battery, such as shorter daily mileage, better care (by drivers with plenty of spare time), and above all the use of pneumatic tires and the selection of the best paved streets. The following data are taken from the repair book of a storage battery factory, which makes a specialty of renting out batteries and keeping them in repair; this concern undoubtedly makes a little sacrifice in the matter of capacity to secure greater mechanical strength.

1. Battery of forty-four cells of 180 a. h. at the rate of 40 amperes, used on a four passenger vehicle of the Compagnie Française de Voitures Electromobiles, making a daily average journey of 28 miles at a maximum speed of 11 miles per hour; ratio of weight of battery to weight of vehicle in running order, 20 per cent. Battery was put in service on May 31, 1901; was washed out August 1, 1901; had the positive plates renewed on October 17, 1901, after 137 trips; was washed on December 23, 1901; had the positive plates changed again on February 4, 1902, after 237 trips; was washed again on April 15, 1902; had the positives renewed a third time on June 4, 1902, after 342 trips; was washed on September 3, 1902, and was finally discarded on November 6, 1902, after 482 trips. The

negatives outlasted four sets of positives. It will be understood that the battery was recharged after every trip.

2. A battery of the same kind as the preceding, used for the same purpose, but on a lighter vehicle belonging to the same company; ratio of weight of battery to weight of vehicle in running order, 33 per cent. The battery was put in service June 25, 1901; was washed on October 30, 1901; positives were changed on January 11, 1902, after 196 trips; cells were washed on April 24, 1902; positives were changed a second time on July 5, 1902, after 370 trips; battery was out of use from July 5 to August 29, 1902, and was put back in service on August 30; was washed on December 15, 1902, and was discarded on March 2, 1903, after 185 more trips, making a total of 555 trips. The negatives outlasted three sets of positives and sustained 555 discharges.

3. Battery of forty-four cells of 120 amperes hours capacity at a discharge rate of 32 amperes, used on a vehicle with motor fore carriage, weighing complete 3,560 pounds; the weight of the battery was 1,100 pounds, or 28 per cent. of the total. This vehicle was used by a private individual and was subjected to less severe treatment than the vehicles plying for hire. The mileage on one charge never exceeded 25 miles, at a speed of 11 miles per hour. The battery was placed in service June 5, 1901; was washed on October 25, 1901, and again on February 2, 1902; the positives were renewed on May 13, 1902, after eleven months' use. The car was out of use from July 16 to October 8, 1902. The battery was washed on October 7, 1902, prior to being placed in service again; the battery was washed again on February 3, 1903, and was finally discarded on April 2, 1903, after the second set of positive plates had been in use for nine months. The negative plates lasted for twenty months of actual service.

There are three conclusions to be drawn from comparing these examples: (1) The second battery sustained the greatest number of discharges and the ratio of its weight to that of the vehicle was 33 per cent., instead of 28 per cent., as for the others; (2) when the positives show a very long life the negatives outlast fewer sets of positives. The maximum number of discharges which the negatives will sustain is between 500 and 550; at that period a sort of disintegration takes place and the active material becomes detached from the support, which increases the internal resistance and diminishes the capacity of the battery. (3) The first set of positives lasts longer than the following sets.

LIFE AND COST OF MAINTENANCE.

Great efforts are being made to increase the durability of the plates. Some manufacturers try to prevent the active material from shedding by enclosing the plate in a porous envelope; others seek to prevent one of the greatest causes of trouble, short circuits between plates, by making pro-

visions allowing the active material which will necessarily become detached in time to drop freely to the bottom; still other manufacturers seek to reduce the cost of construction by manufacturing the plates entirely by mechanical means.

In a storage battery factory in which the manufacture is effected entirely by machinery—that is to say, where the oxides, instead of being applied to the grids by hand in the form of a paste, are applied in the state of a dry powder by means of an hydraulic press—a skilled workman can easily prepare 700 plates in eleven hours, while if the work was done by hand hardly eighty could be completed in the same time. This should certainly lead to a considerable reduction of the cost of manufacture.

The maintenance of storage batteries comprises at present practically only two factors, the renewal of plates and the renewal, at long intervals, of the jars and accessories. Breakage of jars, of covers and connections is now exceedingly rare. As to the ebonite separators between the plates, they seem to be entirely unaffected by wear, or, rather, they have not been in use long enough to determine their length of life; at any rate, they need not be renewed in less than six or seven years. The cost of the plates forms only about one-half of the cost of manufacture of the battery complete, and that of the positive plates consequently only one-quarter.

The cost of maintenance of the batteries is given by the Compagnie l'Electricite as not exceeding 4.5 francs (90 cents) per day. This applies to batteries made by the company itself. M. Verdon, director of l'Equipe Electricque, gives the same figure for the cost. This maintenance figure seems to us a little too low, but experiments made by us covering 26,000 vehicle days show the daily expense not to exceed 5 to 5.2 francs, even under the most unfavorable conditions. It is, of course, understood that these repair figures imply thorough care of the accumulator, because in connection with batteries everything depends upon good care, and the life of the battery may be doubled by always keeping it in perfect repair.

What must be done to keep a battery in good repair? The density of the electrolyte must be tested from time to time, and the batteries washed out to remove active material which has become detached from the plates. Too frequent washing is, however, not to be recommended, as the handling of the plates tends to hasten the shedding of the active material; it seems to be good practice to wash the batteries after every forty or fifty discharges. The connections must always be maintained in good condition, the cells well wedged in their trays, and above all the batteries must never be allowed to remain discharged for any length of time.

CONCLUSIONS.

By comparing the results of practical experience in recent times with those

which were obtainable in 1900, improvement is observable all around. I do not believe that the manufacture of plates has reached the limit of perfection, at least not from the point of view of capacity and mechanical strength. Of course the manufacturers have made efforts to develop these two factors by improved manufacturing processes, insuring greater porosity of the plates; by a more perfect application of the active material to the grids, or by making the positive plates, or even both of the electrodes, in the form of porous envelopes surrounding the active material. This latter solution of the problem, which seems perfect in principle and which the manufacturers claim to have found very satisfactory, does not seem to have been found very satisfactory by users. Electrodes thus constructed also lose a considerable fraction of their original capacity after a certain number of discharges, owing to rather complex causes not yet completely understood.

We would point out again that entirely mechanical processes of manufacture are just as advantageous in this as in other lines of industry, as they insure uniformity in quality of the product and reduce the cost of manufacture. In addition, the "pasting" of the plates by means of the hydraulic press admits of closely regulating certain important qualities—a greater pressure insuring greater durability of the plates, and a smaller pressure increasing the specific capacity and the rapidity of formation.

In conclusion, the electrodes themselves have remained about the same as they were in 1900—that is to say, they deteriorate still too rapidly. The greatest improvement, in our opinion, which has been made, has been in the assembling of the cells and in the accessories.

The separators, for which perforated and corrugated sheets of ebonite are coming into use more and more, avoid short circuits between plates and permit any active material becoming detached from the plates to drop to the bottom of the cell. The inside bottom wall of the cells is provided with ridges, as high as possible, which keep the lower edge of the plates at a certain height above the bottom of the cell and permit a certain amount of active material to accumulate in the bottom of the cell before the plates become short circuited.

The cell covers have also been the object of improvement. Ordinary plates of ebonite, often in several pieces (on account of the soldered connections used), have been replaced by solid covers, often of double thickness, molded, ribbed and provided with a perforated stopper to admit of the escape of gases. In this manner the spilling of the electrolyte, which formerly was the cause of rapid deterioration of the trays and facilitated short circuits between cells, is now almost entirely avoided.

The connections between cells also were a great source of difficulties formerly, but

this problem has now been solved. Formerly the connection was generally made by wires soldered to lugs of lead plates, and these wires often broke, and the arrangement made it difficult to inspect cells with a single piece cover, as it was necessary to break the connections when the cells were to be opened. At present strips of lead foil secured to the lugs of the plates by bronze bolts are generally used. By keeping these connections fairly well lubricated all trouble of breakage is avoided.

An idea of the improvements made in automobile storage batteries during the last three years may be gained from the following comparison, based upon the author's personal experience: In 1899 and 1900, in a service which comprised the maintenance of ten batteries, there was at least one mishap per day due to cracked jars or broken connections. In a service absolutely similar, but which comprises an average of thirty batteries in daily operation, since the end of 1900, there has not been one case of broken cell in 1,000 trips, and in thirty months there have been only two cases of broken connections.

Calendar of Automobile Dates and Events.

- October 22 and 23—Automobile Races of Macon Fair Association, Macon, Ga.
- October 31—Brighton Beach, New York, Race Meet.
- November 6 and 7—Race Meet of the Automobile Club of California.
- December 10 to 25—Paris Automobile Exhibition.
- January 15 to 23—Madison Square Garden Automobile Show.
- January 23 to February 4—Brussels Show.
- January 25 to February 6—Meet of the Florida East Coast Automobile Association.
- February 6 to 13—Chicago Automobile Show.
- February 12 to 24—Crystal Palace Show, London.
- February 15 to 20—Detroit Automobile Show.
- March 19 to 26—Agricultural Hall Show, London.
- March 21 to 26—Washington Automobile Show.

The National Arms Factory at Châtelleraul, France, is to be converted into an automobile factory, having been acquired by a prominent automobile manufacturer.

LESSONS OF THE ROAD

To the Summit of Mount Washington in a Runabout.

BY T. P. DRIVER.

I have owned a small gasoline runabout for three years, having bought this machine after graduating from steam. The first year I was very busy improving it; the second year I was still more busy removing the same improvements (?) and learning to run and care for my machine, which I long since christened "Bill Jones." This year, the third, I have thoroughly enjoyed Bill; and now that we understand each other have made a few real improvements, not radical but satisfactory. During these years I have run over 10,000 miles, and we still live and have never caused any damage through frightening horses. It has been necessary to replace an occasional part, but I have not had a total collapse.

Others say I have had good luck, but it is due to the fact that I have been my own repair man, and, though no brighter than other mechanics, have tried to do things right, and when an adjustment was necessary, or I heard a knock, I attended to it immediately in my auto house. I would rather work on any kind of a machine than ride in it if it rattles or shows any signs of distress, for the ride would have no pleasure for me.

Owners of "stone crushers" have slurred about my little sleigh front, and have asked me if it could climb hills. All this made me anxious to do something grand and inspiring, so I thought of Mt. Washington and decided on this trip. Unfortunately the time I planned to go my friend P. could not go; then when he could go I ought not to, so after only an evening's work overhauling and tightening up the machine, installing two new sets of batteries and oiling it with an extra supply of oil, graphite and grease, we started on Friday afternoon, September 11, intending to get back as soon as possible.

It was 1:45 when we left Melrose. We made Wakefield at 2 p. m. and Danvers at 2:30. From the Plains we took the old Ipswich road, passed through Winham and Hamilton, making Ipswich at 3:25, and through Rowley to Newburyport (4:15), a

fine ride over the best of roads only biased by a speed limit.

After a stop of ten minutes, while we adjusted a steering knuckle that had tightened up, we left for Portsmouth and found some one had taken away the draw from the old wreck of a bridge over the Merrimack. We made so much fuss that I think the construction of the new bridge will be carried on with all possible speed to avoid trouble in the future. Meanwhile all travel is over old Chain Bridge, but I hear this grand old relic is condemned and if any of our "stone crusher" friends have occasion to go over this bridge I would advise them to be careful lest they go through. This detour took time and put us about 6 miles out of the way, but we got back into the post road at Seabrook at 4:55, made Hampton Falls, Hampton North Hampton, Greenland and reached Portsmouth at 5:45 p. m. We stopped here five minutes and then left for Dover.

The sun was just setting as we reached the toll bridge at Dover Point: the view was grand, and romance was in the air. I started to recite "I stood on the bridge," but was interrupted and held up for 10 cents toll, which spoiled all. After the bridge came sand and hills, and "after that the dark." We lit up and proceeded toward Dover, arriving at 7 p. m., after a run of about 75 miles total.

We pulled up at the American House and P. went in and registered, ordering dinner, while I took Bill around for a drink. Just 3 gallons of gasoline put the tank as full as when we started. Then the machine was put to bed in a stable and lamps turned out. The stable man informed me that autos were the cause of all his trouble. I asked him if he owned one, too, but he didn't see the point, allowing horses were good enough for him.

As we were not very anxious to risk another meal at the American House, we left Dover at 4:40 a. m. on Saturday, September 12, without any breakfast (having settled for our supper and lodging the night before), and made good time through the dew moistened sand for 25 miles, through Rochester and as far as Milton Branch, where we stopped at a farmhouse at 6:45 a. m. We ordered breakfast and spent half an hour on Bill, oiling up, filling cylinder oil cup, greasing cups, putting one pump full of oil into the transmission, and filling three grease cups. We washed up with some of that stuff that is so far "ahead of soap" and enjoyed a good breakfast. After giving a fine looking horse belonging to



SANDY ROAD, NEAR OSSIFEE.



WAYSIDE WELL AT OSSIFEE.



A SANDY ROAD IN THE GLEN.



THE START OF THE CLIMB.



ENCOUNTERING A HORSE ON A NARROW ROAD.

our host a little exercise at dancing, we settled and started "up along" ("up" is no dream, either) at 8:10 a. m.

We began to get busy with horses now from time to time, and met quite a number of teams presided over by women, who uniformly became very much excited as we approached. We, of course, stopped, and one of us nudged the skate up the road and past Bill Jones. I think nudge is a good word to describe the action of one in getting a fool horse past an auto, for it always seems to be accomplished by a lot of starts and false starts by the nudgee, with an accompaniment of baby talk or horse talk, at whichever the nudger has had the most experience. I use both myself, with a little dog talk thrown in.

We proceeded through Union, then Sanbornville and Wakefield, which we made at 8:50, then on through a couple more Wakefields to Ossipee, at 9:30. I had toured this route on a bicycle, and somehow I connected the name Ossipee with sand, and my memory was O. K. We passed along slowly through all the Ossipees on the map, with sand and hills and sand thrown in, and met a young lady and

a little girl with a wild horse. We stopped, and P. took pictures of me holding the outfit down; then the little girl was called out of the woods whence she had fled, helped into the carriage, and we waltzed by Bill Jones, receiving thanks and smiles for our pains.

From the photograph you will see that the stop was made at a point where it was next to impossible to take a picture. This seemed to be always the case, for we took many, but few materialized. The horses were very unaccommodating in this way, and I think they were afraid of a camera, too. It rather looked like a hold up, for when we met a team my companion would get out in grim solemnity and proceed down the road toward the refractory animal, and I would get into a good location with a camera for a snapshot. Several parties around North Conway and Jackson squirmed a good deal and turned their faces away, sputtering meanwhile.

At West Ossipee we were kindly advised to take the left hand road through Tamworth and the Chocorna region. This is the best road, for two reasons, the beauty of the scenery and the condition of the road. With the lake at our feet and the mountain in the distance, with its reddening maples, its spruces and its naked odd shaped summit, the scenery is truly beautiful. There is a narrow, hard dirt road winding in and out through the woods, the trees now hiding the lake and making the road dark before us, then suddenly opening up and giving us a glimpse of the beautiful sheet of water nestling among the hills and mountains. This spot impressed us as the pleasantest place we saw during the entire trip.

We soon left it behind and after more sand and sand hills, with some artistic work of the instrument of torture known as the road machine, we arrived at Conway for dinner, at 12:55 p. m. We left at 2 p. m., making North Conway at 2:30. Here we got 3 gallons of gasoline for tank and an extra 2 gallon tank to supplement



WILDCAT RIVER, JACKSON.

the extra 3 gallons we were carrying, as the laundry man told us we couldn't get any above, and the next day was Sunday. We left North Conway at 3 p. m., with good courage, and hoped to get to the Glen before dark, a man having told us that he could drive a good horse up in two hours. As we were plodding along the sand ruts and hills I think I remarked to my companion what an "awful good hoss" that would have to be.

Here on Spruce Hill we met a number of teams. We stopped our motor to let a six horse tallyho by and were informed there were several other teams coming. We waited until fifteen horses (in bunches of two or four) had passed. The last group consisted of a young man and two young ladies in the saddle. Just here occurred what was to me one of the most amusing incidents of the trip. The horse ridden by the young man was rather fiery, so I went to his aid, or rather stood between him and Bill Jones, while my friend went to the aid of the young ladies, and I soon joined him. As this was a rather



ECHO LAKE, AT NORTH CONWAY.



SUMMIT HOUSE, SEEN FROM SPRUCE MOUNTAIN, JACKSON.

dangerous spot we advised them to dismount. In doing this it became necessary for them to hold their habits out of the way and the young lady P. was attending had a strap fastened just below the knee to keep her habit in place. She suggested he unfasten the strap, but being rather confused and dazzled he was unable to see the strap and untied her shoestring instead, she having to unfasten the strap herself. I being somewhat less bashful, as well as a married man, got along better. Then P. made matters still worse, for instead of holding his hand for the young lady to step in he grasped her around the hips and she slid out of her saddle, making a spectacle more interesting than elegant. They all thanked us, and as we left I noticed this same young lady tying her shoe.

Spruce Hill was a hard one, and we afterward learned that the holder of the present gasoline machine record had to call on the Glen House for four hay motors to help him up. However, we were not so much better off, for, between you and me, if my memory serves me correctly, it took strong pushing by both of us for about 20 odd feet to keep Bill Jones from losing his breath. You see if it had been a heavy machine it would have taken hay motors sure. A little help of the kind we gave on a sandy hill rests one, and besides nobody need know it, if you don't care to tell, while if you call for horses the whole country about hears of it within twenty-four hours.

Well, we reached the Glen House on scheduled time, at 5:15 p. m. On coming up the grade to the stable we struck deep sand and a 12 or 15 per cent. grade. As I saw Bill was giving up on this grade I told P. to jump out, and this relieved matters to such an extent that, after perhaps 50 feet, he was able to ride again. The stable men all saw this move and asked us jokingly if we were going to the summit. We allowed we were going to try it, and how they laughed and looked at each other and I think some of them pitied us.

Up to this time I had been using a very short lift on my inlet and a short adjustment on the mixer. This was done with a view to saving excessive strains on the power plant and also so that on rough roads the high speed could be used. It is impossible to keep in the high speed with maximum adjustment without bumping the whole outfit too much. I figured that if I could do almost everything up to the Glen with a short adjustment, I might have some show on the mountain with my trump card.

We had a good baked bean supper and retired at 8 o'clock, as we were somewhat weary. At 4 a. m. we arose and soon ate our cold breakfast that had been left in the dining room for us, and consisted among other things of a large pitcher of milk which, unfortunately, became sour some time during the night. We drank this just

the same, and I explained to my friend that it was quite up to date to have pre-digested food.

Breakfast finished, we went out to the stable, and on the way had a good look at Mt. Washington in the early dawn. How cold, gray and forbidding it appeared with its head bundled up in cotton-wool-like clouds, just as if it were the "morning after the night before." The sight didn't particularly inspire us with a large increase in our ambition, and we realized the worst was yet to come, and besides it was the thirteenth day of the month. But nothing was said, and we got to work. We took off lanterns, the backboard and the tail gate, part of the footboard and rubber mat (for ventilation) and quite a number of tools and parts, also canvas under cover. I made changes in mixer and inlet valve lever, to give the limit of power, and I think we had it, judging from the working of the machine. No circulating water had been added since we left home, and I found that 2 quarts could be put in to fill



STEEP GRADE AT FIFTH MILE.

the tank; this was done as we didn't know just what effect the thin air would produce.

All being ready, we started from the Glen at 5:35 a. m., and went down across the intervals, over the Wild Cat River bridge, and past the unoccupied toll house (the toll being collected at Halfway House now). Here is a large notice that automobiles are not allowed on the mountain, but receiving a "straight tip" we did not allow that to worry us, but began to climb the mountain. We were delighted to get to the 1 mile mark, where we made our first stop, not from necessity but just to look things over. Our object was not to make a time record, but just to make the ascent as easily as possible, and not strain the machine, and get back to Melrose without a break or repair.

I examined the transmission and burned my fingers on it. After a wait we started again and made the 2 mile mark, having made one or two intervening stops. On the steepest grades only one could ride, and when starting up after a stop, in order to ease up on the transmission, we would

both stay out until under way, and then bounce in. Shortly after we passed this 2 mile mark the horn lost its voice because of the rarefied air.

The third mile mark was passed, and from this point to the Halfway House we found the most difficult grade of the whole trip for the motor. It was very sandy as well as very steep, and here for 50 yards we both had to walk, one steering, the other running the throttle and levers. Pushing is out of the question here, as it is hard work walking and keeping one's breath because of the altitude.

The Halfway House was reached at 7:30 a. m. Here we paid \$1.92 toll, got a good drink of water from the rocks, and took several pictures. I injected some oil into the transmission and adjusted the air inlet to the mixer for lighter air. We now put on additional clothing, as we were above the tree line and were getting a whiff of that 45 mile an hour breeze that was blowing on the summit.

After half an hour's stay we proceeded up the mountain. The view was becoming grand, except in the middle of the carriage road, which was beginning to be filled with small loose stone and coarse gravel where the four horse teams struggle up with their loads. All this made traction uncertain, and at times the rear wheels would spin around, and how the rocks and gravel would fly!

As we proceeded it was once more necessary for both to get out, and several times for one of us. The view was ever increasing and the grade decreasing, so that when we rounded the eighth milepost and came in sight of the Summit House we were going easily.

The Glen House, Halfway House and Summit House are connected by telephone, so that as we rounded into view of the Summit we found quite a crowd of spectators watching for us, they having been notified when we left the Halfway House. They waved to us as we came in sight. We arrived in good order at 9:20 a. m.

The last half of the climb was the most difficult, on account of the head wind, and I think Bill felt this altitude as we did. The wind was very strong and against us nearly all the way for the last 4 miles, and a 45 mile breeze, which is no joke on a level, on such grades is a positive insult. During the last half of the climb we also took many pictures.

We made quite a brave showing from the eighth mile to the summit in view of the visitors, but if they could have seen us just around the corner they would not have been so impressed with our ascent. One of us was steering from one side and the other juggling levers on the other side and scrambling for dear life to keep up to Bill and to keep our breath (for the gear on the slow speed, unless the wheels or clutch is slipping, is very much faster than a walk).

As we neared the stable at the summit a photograph fiend came out in frantic

haste and took a picture of us, and the stableman came down and told us to put our machine away out one side, refusing to allow us to go up the last little 15 foot rise; in fact, he didn't seem overglad to see us. However, we were glad we were living, and went in and renewed acquaintance with Mr. Dunham and obtained his signature to a statement that we had arrived in good order.

On entering the hotel office a sharp tongued woman asked what made it take us so long from the Halfway House, but she didn't know any better, and we were there anyway and it did not ruffle us much. We sent a couple of dispatches, and after waiting around a little asked that a telephone message be sent to the Halfway House that we would begin our descent at 10:30 a. m. We then took some photos of ourselves and Bill.

(To be concluded.)

Twenty-five Hundred Miles in a Touring Car.

By C. H. GILLETTE.

The uninformed are often skeptical regarding long tours and often laugh at me when I tell them that it is just as possible to lay out and accomplish long tours in this country as it is in Europe or Asia or any other continent. But there is one argument on my side which generally has the effect attributed to the playing of a "trump card." It is the statement that I have made a run of approximately 2,500 miles without leaving the Eastern States.

The trip I am to describe began in sunny June. Of course I had as good weather conditions as the seasons are wont to accord, and there were other points in my favor—such as a tough, reliable car and a handy chauffeur. One man, whom I am going to call Smith, accompanied me for practically the entire trip as, of course, did the chauffeur Frank. At intermediate points we picked up various friends, who traveled with us, sometimes for a few hours, sometimes for a day or two. But as the enumeration of these guests is not a matter of grave importance I shall not refer to them in my story.

We started out with the definite object in view to cover more than 2,000 miles in the Eastern States. The laying out of the itinerary was a difficult problem, and much of it had to be changed as we went along. Indeed we did little more than follow the general directions of the plan of the route. First we decided to cover the New England States, then New York State, Pennsylvania to Washington, through New Jersey and back to New York.

We set the motor going in the full flush of hope at Long Island City. It was a 16 horse power motor, and a good one. Of course we took the Merrick road. Everybody does who tours Long Island. We had an idea that we might be able to make New London by the first night, but found that when Jamaica. Freeport, Babylon,

Sayville and Patchogue were passed we had covered pretty nearly all we could do comfortably in one day, and so put up at Southampton for the first night out. We had covered 101 miles by the time the shadows began to fall, and were pretty tired of sitting in a car. We ached to stretch our legs a little in a tramp about the town, and turned in with little delay for a good night's rest. Bright and early the next morning, breakfasting at 8 o'clock, we passed out of Southampton, through Bridgehampton for Sag Harbor, crossing the bridge to Hog Neck; and, keeping to the telegraph poles, we came to South Ferry and crossed to Shelter Island; we followed the telegraph line again to Greenport.

Paraphrasing, let me remark right here that telegraph and telephone poles are very convenient guide posts for the automobile tourist. It is pretty safe to

Wood River Junction. At this point we were told that there was a good road running almost directly northward through Hillsdale. We tried it, but decided to take some other road, and finally headed for Kingston more hopefully. We decided that from that time we would pay as little attention as possible to extraneous advice and would stick to the railroads—that is, as near as the lay of the highways would permit.

By the time Wickford was reached we were not sure whether our decision was right or not, and were contemplating retracing our way to New London and starting out for Worcester. But a never say can't idea asserted itself, and we continued in that frame of mind until we reached East Greenwich, where the roads began to be tolerable again.

Beyond Apponaug we were tired, but hopeful and convinced that persistence was



MOUNTS ADAMS AND MADISON, FROM FIFTH MILE.

say that where these poles are the road is fairly good. Moreover the lines lead on a protracted tour has "somewhere" as his objective. That "somewhere" is pretty sure to be a town of importance.

From Greenport we took the ferry across Long Island Sound to New London. It took us some time to decide whether to go to Providence, R. I., or Worcester, Mass. After a due amount of cogitation, discussion and question asking we decided that, though the road to Providence was not so good as the one to Worcester, we should take the one which led to the capital of Rhode Island.

After crossing the ferry over the Thames River to Groton, we took the main road east over the railroad through West Mystic and Mystic, turning over to the shore line. At Stonington. At Stonington we struck out inland again, to avoid bad roads, through Westerly and Niantic to

the only jewel. At Greenwood we cut across the railroad diagonally and followed a fairly good road through Hill's Grove and Pawtucket to Providence. While we had covered in this second day's run—for we decided that Providence was the place for an overnight stop—only 85 miles, we thought that in view of certain shortcomings of some of the roads and the fact that we had been compelled to retrace a few miles we had done pretty well. The first thing we did on arrival was to eat. The best and the most were not enough. We went through the usual routine—"early to bed and early to rise." Between our indigestion from overeating and our eagerness to reach Boston the next night, we did rise early—long before sunrise. Then we had to wait for breakfast. Everybody in the hotel was fast asleep, even the cook. We decided to go out to a nearby bakery and get some coffee and buns, or anything purchasable, to stay our stomachs until some-

one was awake, and to take to the road immediately. When we had broken our fast we found that we could not even force the door of the garage where our vehicle was stored. That, too, was asleep. However, by bribe and bravado, we did finally get away and struck out for Boston.

We had an idea all along that we could possibly make Boston by nightfall. How easy it is to trust to a shaky memory! For some reason or other our idea of the distance between Providence and Boston was something like 100 miles. When we had made Boston by half-past 1 o'clock we came to the conclusion that our ideas of distance were mainly academic. Automobiling, to my mind, develops that much talked of "sixth sense"—in this case a sense of distance and sometimes of direction. Perhaps these instincts are dormant in most men's mentalities. But whether only developed or really created, it is true that long distance touring brings them out.

From Providence the road is good macadam all the way and generally rolling. This route goes through Pawtucket, following the railroad to North Attleboro, Mass. From there, following the trolley line to Wrentham and an excellent State road through Walpole, Norwood and Dedham, we came into Washington street, which is a continuation of the State road, and finally reached Jamaica Plain. Here is where our discovery regarding distance was made. Then we thought we should like to go on to Portsmouth, but our desire to do a little visiting in Boston induced us to make that the third night's stop.

On our third day we had covered about 45 miles, and the sun was scarcely past its meridian. For the rest of the day we did not do any more riding in the car, but rode around the streets in trolleys, seeing people that we knew and several that we did not know.

That evening we laid out our itinerary for the next three days in advance, being careful this time to use a map with the best scale of distances that could be secured. The decision arrived at was to go through Portsmouth, Concord and Brattleboro. Beyond that point we had no very definite idea as to where to go.

The next morning we put out from Beacon street and Scollay square through Chelsea, Lynn and Salem. The road to Beverly nearly shook the car to pieces, but beyond that point we met only the best of roads, and successfully passed through Newburyport, Seabrook and Hampton, and we got into Portsmouth well along toward evening.

Strange to say, while we had covered a little over 350 miles, including the run from Boston to Portsmouth, we had not, to date, had any difficulties with the car whatsoever. We were congratulating ourselves upon the fact that tire troubles, the bane of most tourists, had not been our lot. It was well that we could not see

into the future—for faith is a great stimulant to touring.

It was well on toward noon the next day before we made a start. We made a halt at Exeter, to satisfy the inner man at an inn. It was long before nightfall when we landed in Concord, as we had made this run of 55 miles from Portsmouth in four hours.

The next day's run was to be a long one, about 75 miles. We knew that we would encounter hills and only fair roads, but, of course, did not prognosticate our downfall. We had successfully run through Hopkinton and beyond Henecker, and were admiring a little stretch of scenery to the northward, when someone fired a cannon. At least all but Frank were sure it was a cannon, and could have sworn to the fact had not Frank convinced us that it was only a tire. We were 5 miles from any town and, of course, had to do the job ourselves. There was the usual process to go through. It took us only about an hour, but we had a long day's run ahead of us. We reached South Stoddard when, without warning, we began to go bump, bump, bump, and the same old tire was flat again. We put back into the town to look for someone to do the work for us, but there was no "balm in Gilead," or South Stoddard. Amid an assemblage of curious onlookers of the town, we proceeded to repeat the same process of tire mending. This time the difficulty arose from unskilled workmanship. The patch which we had put on the inner tube had leaked, with a consequent deflation of the tire. By the time it was put on thoroughly and we were on our way, another hour was gone, and it was well into the late afternoon. One of us suggested that we had better put up at Keene for the night, but, the majority always ruling, the other two decided to keep on for Brattleboro. Brattleboro was only 25 miles away, and could easily be done in two hours. Winchester was reached by a trip along the river road. When riding in Main street somebody shot us again. Before we had time to stop, the busy little thoroughfare looked as if a riot was in progress. Few people other than ourselves knew what the matter was. We were pretty certain that most of them thought that we were having an impromptu Fourth of July. This time it meant a new inner tube. This was the only thing left for us to do. By the time we had got everything in shipshape form, the sun had set and we decided to find something to eat in Winchester. We got it, and started out again a little after 8 o'clock. We had gone about 2 miles and were feeling heartsick after about ten hours' riding and repairing the car, when we again got into difficulties. We were going slowly, passing a light horse drawn carriage, with a single occupant, when just as we got abreast of it the same old cannon exploded. It looked as if the horse was the cannon ball by the way he

shot ahead. He would have done justice to the projectile of a 13 inch gun. The horse did not stick to the road but made for a ditch, about 100 yards farther down, at a bend of the road. The buggy was just as lively and bumped so hard that its occupant shot straight up in the air a distance that, as seen in the darkness, might have been anywhere between 10 and 100 feet. When the man came down again he landed in the ditch instead of in the buggy.

Such relief as was obtainable by the copious use of profanity our friend of the buggy obtained. We saw our moral characters and physical defects "as others see us." We couldn't blame the man, but we had troubles of our own, and while we were perfectly willing to lend a hand to a fellow in perhaps still worse difficulties, ours had also to be attended to. The horse had struck the other side of the ditch and was peacefully grazing. We got him back to the road again, but the ejected gentleman was not a bit mollified. He did not seem to understand that we had not purposely shot his horse and induced it to do such an unwarrantable, unknown and unprecedented thing as to run away. The horse (as near as we could gather) had never been guilty of traveling at a greater rate of speed than 4 miles an hour, but from the way he traveled that short distance one would have taken him for a thoroughbred.

However, it was 10 o'clock and to miles from Brattleboro. If we could have found a place to put up for the night we surely would have done so. At Hinsdale we had to run around for a half hour to get some gasoline, and when we finally obtained it it was considerably after 11 and we were still 7 miles from our destination.

The things we said after our chapter of difficulties, when we finally did reach Brattleboro well on toward 1 o'clock, are best passed over. It was a heart-breaking experience. We had covered 75 miles in about fifteen hours.

We started out the second morning—a Sunday intervened, a long, quiet, peaceful, restful Sunday—and the car thoroughly examined and certified to at quite a good repair station, we decided to attempt the 80 miles to Rutland. We did it comfortably in a little under eight hours, including a stop for lunch. We must have exceeded the speed limit, for we passed Bellows Falls but a few minutes over the hour after leaving Brattleboro. That town is 25 miles away. We went considerably slower on account of the hills through Chester, Proctorsville, Ludlow and Cuthbertsville to Rutland.

From Rutland we decided to go northward along the shores of Lakes George and Champlain, crossing to Rouse's Point, N. Y. The next run, 70 miles, to Burlington, would be sufficient for one day, we thought. It is a pretty good road, hilly in spots, and passes through Pittsford, Brandon, Salisbury, Middlebury, Vergennes and Charlotte to Burlington. From Bur-

lington to Rouse's Point is about 60 miles, but the road is not anywhere near as good. We went by way of Milton, St. Albans and Swanton, crossing Hog Island and Missisquoi Bay to Grand Isle in Lake Champlain. Here, instead of going from East Alburt to West Alburt and crossing to Rouse's Point, we turned southward and from Isle La Motte crossed to Chazy Landing. From Chazy Landing we turned northward to Rouse's Point, where we put up for the night.

We argued considerably next morning as to the pro and con of taking the road along the northern border of the State and trying to make Buffalo by that means; but local and apparently good advice led us to believe that we could get but a little way beyond Malone. We set out for Crown Point, and made it comfortably during the next day, despite the fact that it was very nearly 100 miles, the roads, strange to say, being very good, though hilly in spots.

The next day's run, from Crown Point to Glens Falls, though but little more than half the distance of the preceding day's trip, took all our time and was the occasion of much trouble. From Baldwin to Bolton Landing, about 25 miles, was the worst stretch of road that I had ever experienced. We really ought to have taken the advice of the kindly native of Ticonderoga who told us to take the boat down through Lake George. When we got into Glens Falls we were thoroughly exhausted and our car was in bad shape.

The next day's itinerary led us to Albany, by way of Fort Edward, Schuylerville, Mechanicsville and Cohoes. The roads are pretty good and we did the distance in less than six hours. One of us at this point wanted to go toward the west, the other wanted to go back into Massachusetts, and the third had to cast the deciding vote. Pittsfield was decided upon, but as it was only a short distance, the road leading through Greenbush, Nassau, West Lebanon to Pittsfield, we decided, when we reached the latter city, to make North Adams. This we did in the excellent time of less than five hours for 55 miles.

While the distance from North Adams to Springfield is approximately 75 miles, we covered it in a day very comfortably by way of Hoosac Tunnel, Charlemont, Shelburne Falls, Greenfield, Northampton and Holyoke. The next day we went back to Pittsfield by way of Westfield, Huntington and Dalton. After arriving we decided to go on a few miles to Lenox, where we put up for the night.

Poughkeepsie was the next objective, 75 miles away. We went down through Stockbridge and Great Barrington to Lakeville, Conn., and then through Sharon, Amenia, N. Y., and Millbrook to Poughkeepsie. From Poughkeepsie we started north the next morning for Albany, on excellent roads all the way. Staatsburg, Rhinebeck, Red Hook, Hudson and Kinderhook to Albany were passed in good time for a 75 mile run.

This run to Albany was exceedingly good time, considering that here we were overtaken by the first heavy storm we had encountered. It blew up after we had passed Hudson, and in a minute or two had become a downpour. We were only a few hundred yards from a farmhouse and the motherly woman who called to us to drive into the barn looked to us like one of Raphael's angels. We were storm-bound there for two hours, and it required careful driving all the rest of the way. We shuddered to think of what might have happened if the roads had been other than good.

(To be concluded.)

Boston-New York Tour in an Electric Car.

A tour from Boston to New York was recently completed in a touring car manufactured by the Buffalo Electric Carriage

of adjustment, etc. The entire cost of charging current during the trip was \$15. The party left Boston on Friday, October 16, at noon, and passed through Worcester to Springfield, where they spent Friday night. The battery was first recharged in Springfield. The trip was continued on Saturday morning and lunch was taken at Hartford, the next night's stop being made at New Haven. On Sunday the run was continued to Bridgeport. Mt. Vernon was reached on Monday night, and New York on Tuesday about 11 o'clock a. m. Just outside the city the tourists were met by a party of automobilists, who accompanied them down through the park, and later a luncheon was given in honor of the tourists at Pabst's Grand Circle.

The machine was recharged four times during the trip of about 230 miles—at Springfield, New Haven, Bridgeport and Mt. Vernon. It is now on exhibition at the showrooms of Babcock, Atwood & Bowen.



BUFFALO ELECTRIC TOURING CAR.

Company, of Buffalo, N. Y. The car weighs complete with its battery 3,600 pounds, and is claimed to have a radius of 75 miles on one charge, and to be capable of a speed of 25 miles per hour. The car is fitted with two to horse power motors and a special battery of forty cells, each cell comprising nineteen plates. The electrical equipment of this car was designed by F. A. Babcock, Jr. During the trip from Boston to New York the car was occupied by four persons—F. A. Babcock, Sr., his wife and son and a representative of a Boston paper. The following details regarding the trip were furnished our representative by Mr. Babcock:

During the progress of the trip absolutely no repairs were made to the machine and no wrench applied to it for purposes

of adjustment, etc. The entire cost of charging current during the trip was \$15. The party left Boston on Friday, October 16, at noon, and passed through Worcester to Springfield, where they spent Friday night. The battery was first recharged in Springfield. The trip was continued on Saturday morning and lunch was taken at Hartford, the next night's stop being made at New Haven. On Sunday the run was continued to Bridgeport. Mt. Vernon was reached on Monday night, and New York on Tuesday about 11 o'clock a. m. Just outside the city the tourists were met by a party of automobilists, who accompanied them down through the park, and later a luncheon was given in honor of the tourists at Pabst's Grand Circle.

Among the drivers of resource and determination in the Endurance Contest, Frank Nutt, who drove one of the Haynes-Apperson cars, certainly deserves mention. It will be remembered that in last year's run to Boston this same driver was forced into a ditch, which took the front gear from under his car, and although this occurred in the open country, he was on the road again in one hour and thirty minutes.

-COMMUNICATIONS-

Storage Repair and Supply Conditions in Mexico.

MEXICO, October 15.

Editor HORSELESS AGE:

In your issue of September 27 last there appeared a communication containing a general complaint of the state of affairs here, under the title of "A Wail from Mexico." Your correspondent's wail consists of a triple attack on the city government, the Waters-Pierce Oil Company and the existing garages and repair shops.

As for the new regulations for the control of automobiles, they are based upon the rules now in effect in Paris, and were submitted to the governors of the Automobile Club of Mexico for revision prior to publication. They are reasonable, and are calculated to protect the rights of automobilists and the general public alike. The fee of \$8 per month is not peculiar to automobiles, but is charged, and has been for years, on all pleasure vehicles, horse drawn or otherwise. There is no reason why an automobile should be exempted from this general tax.

As to the Waters-Pierce Company's price for gasoline, it is undoubtedly high.

We desire, however, to warn the optimistic mechanics or repair men whom THE HORSELESS AGE's correspondent invites to come here and get rich, to check the aforesaid correspondent's figures before they invest their money in two or more large garages and repair shops in the City of Mexico.

We will give a few figures ourselves, merely to show the possible newcomers what they will be "up against" when they embark in the business here and cut under the exorbitant prices now prevailing.

We have a garage here of sufficient capacity to house all the automobiles now in operation in Mexico City, or, say, 150 vehicles. We have an electric charging plant capable of charging all the electric vehicles, say 50, now in operation here, and we are doing it. We have a force of men capable of repairing any automobile of any system or make, provided it is not worn out or has special missing parts that cannot be procured here. For all cars sold by us we carry in stock such parts as are liable to be needed for replacement.

To owners of electric vehicles we charge for storage, cleaning, oiling, charging of batteries, pumping tires, testing of electrolyte and keeping batteries filled with same, as well as general attention to and oversight of all the running parts of vehicle, the sum of \$40 Mexican silver per month, equivalent at exchange ruling here during last six months to between \$15.40 and \$18.20 United States currency. In other words, the owner of an electric ve-

hicle in Mexico City can run 600 to 1,200 miles a month under a total maintenance and fuel charge of \$15 to \$18 United States currency. He needs no chauffeur nor servant, as we frequently send for and deliver his automobile at his residence without extra charge, although we do not bind ourselves to do so.

To owners of steam and gasoline cars we charge \$20 per month (say \$7.70 to \$9.10 United States currency) for storing, cleaning, oiling and attention. They furnish their own gasoline, or we furnish it at cost.

Our garage is open every day, including Sundays, from 7 a. m. to 9 p. m. At that hour the doors are closed, but by ringing the bell at entrance access can be obtained until 12 p. m. Cars are all washed at night and ready for use at 7 a. m. Electric vehicles are also charged at night and ready for use in the morning. If brought in during the day and needed as soon as possible, they are put on charge at once.

Repairs are made at fair prices, and in every case at a lower price than the same work would be done at any well regulated garage in the States. We do not consider the price of \$3 Mexican currency (\$1.35 United States currency) mentioned by THE HORSELESS AGE's correspondent as exorbitant for patching a tire. We have frequently charged more. It depends on the tire and the patch.

As a matter of fact, we find that there is little repairing to be done to first class automobiles which are handled intelligently. If the wailing correspondent had bought a good car in the first place, of a leading factory and through an established local agent whose interest lay in having his machine as seldom under repair as possible, he would have found little occasion to pay repair bills.

MEXICAN ELECTRIC VEHICLE COMPANY.

Position of Diaphragm in Fire Regulators.

Editor HORSELESS AGE:

Please settle a dispute between myself and a friend regarding the correct position of the diaphragm in the automatic fire regulator on a steam carriage. He holds that, as there is as much pressure on one side as the other, it makes practically no difference which way the diaphragm is put in. As you know, it is provided with a raised ridge near the outside edge. Which side of the ridge, the convex or concave, goes next the steam pressure? The cuts in "Self Propelled Vehicles" show it both ways. The one in

question is shaped like Fig. 1, with side B next the steam. C. A. WILLIAMS.

[A diaphragm with a circular ridge near its outer edge could be used to almost the same advantage both ways. It is always used with the ridge on the spring side, probably for the following reason: The pressure of the spring is nearly always in excess (except when the fuel is shut off by the regulator), and then the diaphragm rests against the end plate of the regulator. With the ridge on the spring side the inner surface of this end plate can be plane, which makes for simplicity in construction. For similar reasons the diaphragm shown in Fig. 2 is used with its concave side toward the spring, though in the latter case the fact that the centre of the diaphragm has a greater range of motion in the direction of the concave side also makes it advisable to use the diaphragm in that way.—Ed.]

Air Rudders for Track Racers.

Editor HORSELESS AGE:

Would a vertical plane of some smooth, rigid material set at an angle to the direction of a car tend to prevent the car from overturning in making speed around a small race course? Suppose the plane was pivoted to the front end of the car and extended a little forward beyond the length of the same. In approaching a curve the plane could be moved around on its pivot slightly, so the air resistance would come on the outer side of the plane, and would overcome the tendency of the car to overturn owing to centrifugal force. Would high powered cars be retarded any more by the air resistance on the plane than they now have to be slowed down in order to negotiate the turns in safety? The plane would serve the same purpose as the centreboard and rudder do on a sailboat. It could be swung into parallelism with the direction of motion of the car on the straight portions of the track, and then would offer very little resistance.

A discussion as to the merits of the above idea in your valuable paper would probably lead to experiments and practical application, which would make for real sport in automobilism equal to that of yachting, as the results would depend more upon skillful manoeuvring on the part of the driver.

ALBERT GABLE.

[The use of such a plane at high speeds would oppose the tendency of the car to overturn in making corners, but we doubt whether it has any practical value in track races, as with properly designed racers the limit of speed on the turns is limited by the tendency to skid and the enormous side strains on wheels and tires, rather than by the danger of overturning. Whether the retarding effect of the plane would lead to a greater speed reduction than that necessary without the plane to make the turn safely cannot be answered definitely, as that would depend upon a great number of variable factors.—Ed.]



SKETCH OF DIAPHRAGMS.

A Passenger's Experience on the Endurance Run.

Editor HORSELESS AGE:

Being an enthusiastic user of the automobile since the day of the light steam runabout, with nothing else available the writer accepted with pleasure an invitation from the Haynes-Apperson Company to occupy a seat in Car No. 31, a tonneau. Unfortunately, business matters prevented accompanying the car on the first day, so arrangements were made to meet it at Unadilla on the second day. The trains, however, were so far behind their schedules that the car was met at Bainbridge, to miles east of Unadilla, where it had been delayed until Saturday because of some annoying troubles with the chain drive of the circulating pump having held it back between Pine Hill and Unadilla sufficiently to put it just behind the heaviest part of the floods down the valley.

We left at 3 o'clock, with many admonitions that it was foolish to attempt the trip, because it would be impossible even for horses, and that we were in great danger of landing at the bottom of a gully or in the river. We took to the mountains instead of following the road in the valley, and although we had many a hard climb to get around the floods, which were worst at Alton, where the water was to feet deep over the roads in many places, everything went well until reaching a point between Harpersville and Sanitaria Springs, where we had to work the machine through water reaching above our knees, as there was no road around the spot unless we went many miles back and over the hills.

On Sunday, when 7 miles from the Bennett House, Bath, we struck water over the road 8 feet deep, and as there was no way around this point we investigated the possibilities of the Erie Railroad, running on an embankment here, and finally worked the machine onto the track and rode the ties for over 3 miles to Hooper Station. It was necessary to lay fence boards and such material as could be ob-

tained over the trestles and culverts. The statement to us that a horse could not go through was correct, but an automobile can do things that a horse cannot. One of the contestants attempted to follow us onto the railroad, but failed, and had to be hauled back and off the track with a team. The racking and strains thrown on the machine were terrific, and it seemed as though even the best of design and material would have to give way, but there was no apparent damage except to one radiator tube, which probably caught on the railroad ties and began to leak so much as to demand attention. We finally reached Union, where the radiator was repaired by sawing out one of the tubes and plugging it with pine plugs. This repair lasted into Pittsburg, and was made while breakfast was being prepared, so that no time whatever was lost because of it.

The ordinary city notion that the farmers are opposed to the automobile was completely removed from our minds, as we received nothing but the kindest treatment and the most urgent entreaties not to attempt further travel, but to be made comfortable until the weather had improved and the floods passed off. We were several times obliged to avail ourselves of this extreme hospitality at meals, but could not afford the time to stay over night, as so far we had averaged but about four hours' sleep, the remainder of the twenty-four hours being spent in attempts to go forward.

On Monday we managed to reach Corn- ing, after many detours. In one place we were obliged to take a lumber road very seldom used. The road surface was mostly boulders and rock, and the grade in some places was so steep that the carburetor in the front of the machine was above the level of the gasoline tanks under the seats. Part of the distance up this mountain was made by one man blowing into the gasoline tank and keeping on sufficient pressure to force the gasoline up into the carburetor. At one point we were obliged to travel nearly 5 miles on log roads over the mountains, in order to

make a distance of one-quarter of a mile on the main road, all of which was under water, with the bridges gone.

The whole endurance run was more of a test of the endurance of men than of machines, and any contestant delayed for but a few hours from any cause whatever at Pine Hill or near there was doomed to fight the entire distance against conditions that no ordinary tourist would attempt to overcome. As a friend of the writer aptly remarked upon greeting him: "The whole bunch should be at Dixmont, which would be the proper place for them to stop for good." To those who do not know, it may be stated that Dixmont is the insane asylum just outside of Allegheny.

The test went to prove that the American automobile can go through road conditions impossible for the ordinary horse and wagon. Many of the machines that were belated early in the run could have been brought up to the front rank if the men had been available, as practically all of the machines in the contest were, with the exception of a few minor necessary repairs, in as good condition when they reached Pittsburg as when they left New York.

A small machine had as much show as a more powerful one, because for a number of days there was no chance whatever to use anything but the low and intermediate gears, even in places where ordinarily many miles could be made at good speed.

While the entire trip was one that was full of experiences and rather strenuous pleasure, it is one that no sane man would undertake under the conditions existing except in a contest. There would certainly be no call for machines to withstand these road and weather conditions as strictly pleasure vehicles.

E. E. KELLER.



THROUGH FLOOD ON RAILROAD TRACK NEAR BINGHAMTON.



CAR NO. 31 MOTORING UNDER DIFFICULTIES NEAR HARPERSVILLE, N. Y.

An Improvised Repair of Broken Springs.

Editor HORSELESS AGE:

As sketches and descriptions of repairs made on the road are of more or less educational value to automobile owners, I enclose you a photograph showing a repair I made on the two front springs of my machine during my trip this season.

You will notice by looking at the photo that there is a roll of something under each spring. These are bumpers that I devised while on the road 40 miles from any shop where I might have had my springs repaired or replaced. I was running at about a 20 mile clip on what appeared the best kind of road when suddenly I came to a narrow, deep ditch that cut across the road, and before I could stop I was into it and broke all three upper leaves in both front

them from coming apart. I then raised the carriage body, now resting on the axle, and placed a roll between the upper and lower part of each spring and lowered the body down on them. I then strapped each spring down, which kept the bumpers in place and the body from jumping up or rocking out of position.

The flexibility of these bumpers was surprising. You would never have known the springs were broken. Not having time to get them repaired and being unable to get new ones, and because the bumpers were such a good substitute, I ran my rig over 1,000 miles before having a change made. My roads were not all boulevards either, as I crossed the Pacheco Pass and went over the notorious San Juan Hill. I joined the participants of the California Automobile Club at San Juan and went with them to the tournament at Del Monte. Scarcely

lon of kerosene on ordinary roads, and close to 10 miles on fine pavements in the city. My carriage is a Mobile dos-à-dos, and I carry two grown persons weighing about 300 pounds together, and four children from five to ten years of age.

During a recent trip of 48 miles, 10 miles of which was through the Hoosac Mountains, and 6 miles of almost continuous hard climbing, I used 6 gallons of fuel. The grades of this route are so steep that one party told us he had seen a good many turn back, but I had no trouble whatever in climbing them, maintaining a steam pressure of 220 pounds with six in the car.

I would like to ask whether this fuel consumption is as good economy as could be expected of a carriage of the weight of mine, and carrying the load it does. I see that one manufacturer advertises in the trade journals a fuel consumption very much lower than this. Perhaps that refers to a very light carriage running on fine pavements with only one passenger. I do not see why one burner should use more fuel than another if both are well made.

When I first began to use a kerosene burner I had a good deal of trouble with it for a considerable time, but after working over it and refitting it, I now have it so it does not clog, gives a blue flame, and never smokes. But I cannot get as many miles out of it as I was told was possible. The manufacturer said that I would be able to run 12 miles or more on 1 gallon, and some even told me that 15 miles could be made. If this can actually be done, I would like to get my burner in such shape as to make this possible. My car runs very free when the wheels are raised from the ground with a jack, with the engine dead. A slight twist by hand will cause the wheels to turn around two or three times.

When I used gasoline 1 gallon would run me 1 mile less than 1 gallon of kerosene on average roads, and on good pavements the kerosene is good for 2 miles more than the gasoline. H. W.

[The economy figures given in advertisements are naturally the best results obtainable under most favorable conditions. In the case mentioned the fuel consumption undoubtedly refers to a light car on a very good pavement, and you could not expect to equal this economy with a car carrying six persons. We have no information at hand of the fuel economy secured by other kerosene burner users, but the following figures relating to the fuel economy tests in connection with the 100 mile endurance contest of the A. C. A. last year may be of interest to you. The fuel consumption varied between 1 gallon for 5 to 8 ton miles—that is, for 5 to 8 miles for a car weighing with passengers 2,000 pounds. The average for all the steam machines was 62.3 ton miles per gallon.]

We should be glad to hear from other



J. C. CUNNINGHAM'S STEAM CARRIAGE, SHOWING BURLAP BUMPERS UNDER FRONT SPRINGS.

springs. I was only a little way from a ranch house, where I went and asked for assistance. The people had no shop, but said I was welcome to all the baling wire and scraps of iron I might find lying around.

I was about to put a piece of iron on each side of the broken parts and wrap them with wire, when it occurred to me that I might make some kind of a bumper. I knew that wood or any hard substance would be just the same as letting the body rest on the axle, so it must be something yielding. Looking around I noticed an old burlap grain bag lying on the ground. I picked it up and asked if there were any more, and the gentleman brought me several of them.

I then cut the bags or sacks in strips about 7 inches wide and made them into two rolls about 5 inches in diameter. After this I tied strings around them to keep

anyone met or passed me but noticed the bumpers and complimented me on the novel idea.

The photograph I send you was taken without my knowledge on top of Military Reservation, where the hill climbing test ended. Accompanied by my wife and son I had just joined the group of anxious spectators who were waiting the judges' decision of a very close race, when the photographer snapped us. The bumper on right side of carriage shows up well.

J. C. CUNNINGHAM.

Kerosene Burner Results.

Editor HORSELESS AGE:

I have been experimenting with kerosene this summer, and have had very good results. I want to ask, however, if you know what experience others have had. I can get just about 8 miles out of 1 gal-

readers using kerosene burners as to their fuel consumption, but it would be desirable that the weight of the car be given.—**Ed.]**

Grades in the Endurance Route.

Editor HORSELESS AGE:

As you know, I am a crank on "grades" and take special pains to call attention to rank guesses by your correspondents on the slopes they report. I have just been reading the most interesting account by Harry E. Dey of his experiences on a delayed Endurance Run car. Near the end he writes: "We continued on over the river to Pittsburg and out the boulevard on our second speed (10 to 14 per cent. grade several miles) to Bellefield avenue and Hotel Schenley." This is the Grant boulevard, and I wish to state that it is a matter of city record that the steepest part of same is just 5 per cent., which is in two portions, which I should guess to be about three-eighths and one-quarter mile long respectively. Total length of boulevard is not quite 3 miles, part of which is down grade, and, with exception of the two stretches referred to, there is nothing over 2 or 2½ per cent. I have not the least doubt that Mr. Dey wrote the above from memory, and thought he was making a conservative estimate of those grades. It is an excellent illustration of how easy it is to get a wrong impression. **R. W. B.**

[Mr. Dey undoubtedly based his remark on the official road description of the contest, which reads: "Two blocks on Grand, turn right, then next turn left to boulevard. Straight out (up to 14 per cent.) to end of boulevard," etc. We are obliged to our correspondent for pointing out the error.—**Ed.]**

Steam Omnibuses and Lorries Wanted in the West Indies.

TOLEDO, Ohio, October 23.

Editor HORSELESS AGE:

We are enclosing herewith copy of letter received from one of our agents, F. S. Dimmick, Bridgetown, Barbadoes, West Indies. You will note this inquiry calls for steam omnibuses, and as our product does not consist of this type of vehicle, we trust you may forward this information to some of your clients who may furnish the desired information on the subject.

POPE MOTOR CAR COMPANY,
Per C. S. BROWN.

(ENCLOSURE.)

BRIDGETOWN, Barbadoes, W. I.,
October 11, 1903.

Required.—Quotations and full particulars on steam omnibuses and steam lorries embodying "as near as may be" the following specifications: Quotations to be for goods cased for ocean shipment f.o.b. New York and with discounts on a separate sheet.

Steam Omnibus.—Open canopy covered car with weather curtains; seating capacity,

from fourteen to twenty passengers; condensing engine (preferred); kerosene fuel; wood artillery wheels; solid or cushion tires.

Steam Lorry.—Five to ten tons carrying capacity; kerosene fuel.

F. S. DIMMICK.

Information Wanted on Kerosene Burners.

Editor HORSELESS AGE:

On May 28, 1902, you issued a special "Kerosene Number," which left the impression in my mind that a kerosene burner for an automobile had yet to be found.

There has appeared in your columns nothing since that date of any particular interest to anyone who would like to use kerosene instead of gasoline for fuel under a steam boiler in an automobile.

Several makers are advertising kerosene burners which they claim are successful. Are there any considerable number in use? Your paper has had many instructing and amusing personal experiences, relating to pleasures and difficulties of all sorts. Can any of your readers speak from experience on the above topic? **W.**

New Incorporations.

Auto Traffic Company, of Pittsburg, Pa.; to establish an automobile livery business.

Cluts Manufacturing Company, of Cuba, Ill.; to manufacture automobiles; capital, \$25,000.

Jefferson Automobile Livery Company, of Detroit, Mich.; capital, \$20,000; incorporators, E. W. Snyder, J. F. Degal and W. T. Lane.

The Tri-State Automobile and Supply Company, of Memphis, Tenn.; to make automobiles; incorporators, L. M. Hall, F. F. Hill, W. T. Arrington, G. W. Browne and Caruthers Ewing; capital, \$3,000.

Erie Auto Coach Company, of Erie, Pa.; capital, \$25,000; directors, Walter Scott, H. N. Thayer, George J. Schaaf, Jacob Roth, Cassius McCreary, John M. Miller and Henry A. Clark, all of Erie.

Holcomb Manufacturing Company, of New Haven, Conn.; to take over the automobile business of H. C. Holcomb; capital, \$50,000; incorporators, H. C. Holcomb, Henry W. P. Manson and M. Tolman.

Rhode Island Electro-Mobile Company, at Augusta, Me.; to make and sell electric storage batteries; capital, \$200,000; president, I. L. Fairbanks; treasurer, J. Berry; directors, I. L. Fairbanks, J. Berry and L. A. Burleigh, of Augusta; W. B. Snow, L. W. Horton and W. H. Horton, of Providence, R. I.

Richmond-Jarvis-Caro Company, of Grand Rapids, Mich.; to deal in Rambler automobiles, etc., and to conduct a garage; capital, \$50,000; stockholders, A. B. Richmond, W. B. Jarvis, Leo A. Caro, Charles B. Kelsey, James B. Bayne, John Waddell, William Harrison, A. S. White, J. A. Stiles, Charles H. Perkins, C. O. Snedley, George R. Perry and others.

Accidents.

Ex-Mayor George W. Fifield, Lowell, Mass., was slightly and his father, Sylvester Fifield, very seriously injured in an automobile accident last week.

May Benton was dangerously, and three other persons were slightly, injured at Buffalo, N. Y., October 21, by being thrown out of their automobile, which collided with a trolley pole.

An automobile occupied by Dr. and Mrs. Lewis Stern was overturned at Seventh avenue and Fortieth street, New York, on October 18, and both occupants were severely injured.

An auto truck operated by Herman Metscher and Henry Grill, was wrecked by a rapid transit train in Brooklyn, N. Y., on October 22 and Metscher, severely injured, was taken to a hospital.

Henry Grant and a friend, of Providence, R. I., were thrown out of their automobile at West Roxbury, Mass., on October 17, as a result of a collision with a trolley car, and the machine was badly damaged.

An automobile numbered "842" plunged over an embankment in Lincoln Park, Chicago, during the night of October 17, and was badly damaged, but the police have been unable to find the occupant.

The automobile of Dr. Charles Bellows, of Brooklyn, N. Y., was overturned by running into a street excavation on October 18 and he and his chauffeur sustained a severe shaking up, narrowly escaping with their lives.

While Rev. Mr. Simmerton was backing his automobile on a narrow road at Raritan, N. J., on October 22, in an attempt to avoid a frightened horse, the machine plunged over an embankment into a canal. Mr. Simmerton had a narrow escape from drowning and the car was wrecked.

During an attempt to beat the record run from Chicago to Cleveland the wheels of the automobile of Charles Gray, president of the Chicago Automobile Club, caught in the street car tracks near South Bend, Ind., while going at nearly 30 miles an hour and the car was almost totally wrecked.

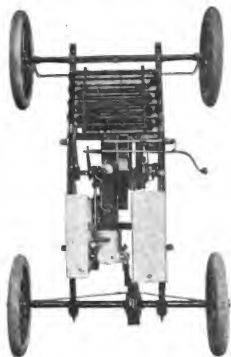
Queer Passages in Automobile Laws.

There has been much comment recently in this country on the ambiguities of the Massachusetts automobile law. In this connection it may be of interest to state that the rules in force in Berlin, Germany, require "each vehicle to have two independent brakes each capable of bringing the car to a stop on level road in 8 metres, at the least, which might be interpreted as "in 8 metres or more." Another recently adopted city ordinance requires that "at street crossings, etc., the speed must be so slow that the vehicle can be stopped on the spot." If this means instantaneously, as it undoubtedly was intended to, it is another case of the laws of man being inconsistent with the laws of nature.

NEW VEHICLES AND PARTS.

Oldsmobile Delivery Wagon.

We show herewith a plan view of the chassis of the new Oldsmobile delivery wagon. It differs from the Oldsmobile



runabout only in having a longer wheel base. Tests are said to have been made with the vehicle for upward of a year. There is no noticeable odor in the box and the latter can be heated in winter, so that flowers or perishable articles can be kept in an even temperature. It is expected that this vehicle will become popular for rush orders and quick work.

New Loomis Touring Car.

The Loomis Automobile Company, of Westfield, Mass., have brought out an 18 horse power touring car of the tonneau type, which, while not differing in external appearance from the accepted style

of the day, embodies some characteristic features.

The engine is of the three cylinder type with cylinders $4\frac{1}{2}$ inches in diameter, with a $4\frac{1}{2}$ inch stroke, and is mounted in front under a bonnet. The water jacket is not cast with the cylinders, but is of a rectangular form built up of flat plates, surrounding the upper portions of the cylinders and giving a free water space. The entire lower portion of the engine casing is readily removable to obtain access to the reciprocating parts, and is designed to hold oil for splash lubrication. The exhaust and inlet valves are unusually large for the piston displacement, being $1\frac{1}{2}$ inches in diameter, with a three-sixteenths inch lift. The contact device consists of an insulating disc carrying a platinum segment upon which bear in succession roller contacts for the respective cylinders. A triple induction coil manufactured by the American Machine Company is mounted directly upon the dash, and dry batteries are employed. A cellular radiator of the Mercedes type is used, which is cooled by means of a fan, belt driven from the flywheel. The centrifugal circulating pump is driven by a belt which is automatically maintained at the correct degree of tightness.

The starting crank is permanently attached. A special hand forging of unusually liberal dimensions forms the crank shaft, which runs in four bearings of good length. The flywheel is of ample weight and 16 inches in diameter. The well known Loomis carburetor and muffler naturally form parts of the equipment.

The engine shaft, which runs lengthwise of the car, is attached through a flexible coupling to the change speed gear, which is enclosed in an oiltight splash case. The separate clutch system is used, giving three forward speeds and a reverse, all secured by the manipulation of one lever.

The clutches are of the internal expanding type and are successively "picked up" by the motion of the operating lever without noticeable jerk or jar. The gears are of steel meshing with bronze, and the ro-

tating portions of the clutches carry small buckets for distributing the oil. The bearings are all brass bushed. A bevel gear on the second shaft of the transmission meshes with another bevel gear on a countershaft which carries the driving sprocket. These gears are provided with ball thrust bearings. A Baldwin chain transmits the power to a bevel differential gear of six pinions carried in the centre of the specially constructed rear axle.

This axle is 19-16 inches in diameter, and is stiffened by a conical casting surrounding it on each side of the differential, having its large end bolted to the differential casing and the small end closely fitting the axle. This acts as a continuous truss and prevents the spreading of the differential or the bending of the axle. The axle bearings are balls, with one set on each side of the rear springs. Double ball bearings are also used in front. Half-elliptic springs of a peculiar design are employed throughout, and their form is such as to prevent their striking together or being unduly strained by the rebound.

The frame is of angle iron and wood. A worm and wheel steering gear is used, with large, brass armed wood steering wheel. The wheel base is 87 inches, and the gauge 56 inches. The wheels are of the artillery type, of 30 inches diameter, and shod with $3\frac{1}{2}$ inch detachable tires. The foot brake which is ordinarily used acts to expand internal metal members against drums secured to each rear wheel. There is also an internally expanding drum brake in the gear case.

Throttle and spark control are located on the steering column, and one lever at the right of the operator controls all gears. Twelve gallons of gasoline are carried. The standard body finish is a handsome blue, with maroon leather upholstery.

New Cummings Tire Protector.

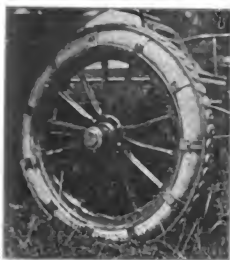
The illustration herewith shows a new form of tire protector invented by Lincoln C. Cummings, of Brookline, Mass., who claims to have found it a practical and serviceable device for protecting pneumatic tires from all chafing and wear, and for preventing punctures and skidding. He furnishes us the following description:

The protector is composed of a rubber tread to fit over any tire, with a steel tread of drop forged disks pivotally attached to the rubber tread. This flexible steel tread on a flexible rubber band cooperates with the tire to secure perfect freedom from jar and noise. The steel tread has traction qualities superior to those of ordinary rubber tires and prevents side slip and skidding.

Holding straps of rubber with galvanized steel hooks snap on to endless wires on each side of the tire. The protector can be put in place or removed in a moment's time when the tires are deflated.



EIGHTEEN HORSE POWER LOOMIS TOURING CAR.



CUMMINGS TIRE PROTECTOR.

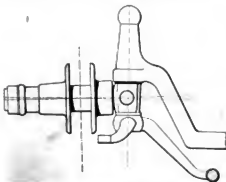
and are held with sufficient tension when the tire is blown up again to prevent all possible displacement laterally or circumferentially under any strain. Inside of the protector is a band of pure rubber which adheres to the tire and increases the hold.

The endless mobile wires form an independent securing means for both the protector and the tire. Once in place, no adjustment or attention is required. The protector is lined with heavy compressed felt treated to make it water proof, and after long use the tire shows no wear or mark of use. The protectors have been used all season on two Autocars, and the drop forgings, being pivoted on a flexible material, show but slight wear.

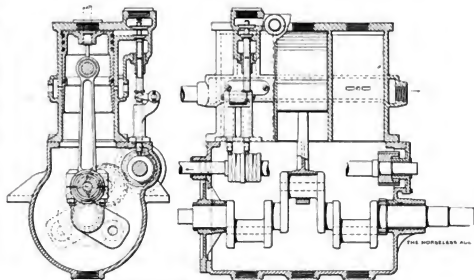
A company is to be formed to place them on the market, and it is proposed to guarantee the protectors fully.

New Billings & Spencer Steering Knuckles and Axle Ends.

The Billings & Spencer Company, of Hartford, Conn., have recently designed a front axle construction of the French or Lemoine pattern. The axle is of $1\frac{1}{2}$ inches and is designed for touring cars of from 12 to 30 horse power. They are claimed to be made of the best material for the purpose and can be finished in various ways, as the manufacturer may desire.



B. & S. STEERING KNUCKLE AND AXLE END.



SECTIONAL VIEWS OF THE DIETER STEAM MOTOR.

The Dieter Steam Hydrocarbon Motor.

The Black Diamond Automobile Company, Brooklyn, send us the accompanying sectional drawing of their single acting steam engine, which is intended to be used in connection with a gasoline engine for automobile purposes. The two motors are secured to each other with their respective cylinders in line with one another. The two motors together are said to weigh about 180 pounds, to occupy a space 26x10x8 inches, and to develop 30 horse power, the steam engine 20 and the gasoline engine 10. It is claimed that each motor can be operated separately.

Chester C. Boynton has been appointed secretary-treasurer of the Independent Automobile Association of America, Flatiron Building, New York city.

Padgett's Power Tire Pump.

The illustration herewith shows the car of J. M. Padgett, a private owner, of Topeka, Kan., which he has fitted with a motor driven tire pump, as clearly shown in the illustration. The pump proper resembles a bicycle pump, the barrel being constituted by a 1 inch tube and surrounded by a water jacket 4 inches in diameter and 12 inches long, to keep it cool.

The pump is driven by a crank and connecting rod, the crank disk being mounted on an extension of the circulating pump shaft. Ordinarily the shaft runs loose in the crank disk. When it is desired to operate the pump a key is inserted between the crank disk and the shaft to secure the crank to the shaft. Then the engine is started and the tire pumped up in about



MR. PADGETT'S CAR FITTED WITH HIS POWER TIRE PUMP.

one-quarter the time it would take by hand. The hose is long enough to reach to the tire valve of every wheel. The air is prevented from re-entering the pump by a small ball valve at the outer end of the pump barrel.

Increased Rubber Prices.

The Diamond Rubber Company write us as follows:

"Manufacturers of rubber tires and rubber goods in general are facing a situation as to prices of raw material which emphatically confirms the clause 'on account of the increased cost of crude rubber' occurring in notices relative to prices within the past several weeks. The rise in rubber prices has been steady for several months past, and they are now 50 per cent. higher than they were a year ago at this time. Present quotations, indeed, are the highest in the history of the trade with the possible exception of a short time in 1882, when the market was at high water for a fortnight or so.

"But on that occasion the high prices were but temporary, while it seems only too probable that the advanced figures now obtaining will continue indefinitely or advance even further.

"Regarding the market situation, the *India Rubber World*, a recognized authority of the trade in America, says: 'It would be a strange thing now, in view of the undoubted small supplies of rubber and the active consumption, if prices were not high.'

"The *India Rubber Journal*, an important Great Britain publication, also comments on the greatly increased prices of crude rubber, but does not undertake to predict the outcome.

"A factor of importance in the situation is that not only fine Para, but all grades of rubber are at top notch prices."

Trade Literature Received.

N. A. Christensen, Milwaukee, Wis.—"Motor Driven Air Compressors."

Joseph Dixon Crucible Company, of Jersey City, N. J.—"Graphite Lubricants."

Joseph W. Jones, 127 West Thirty-second street, New York City—"The Jones Speedometer."

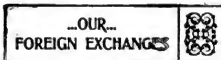
Praet & Whitney Company, Hartford, Conn.—Catalogue of small tools, standards and gauges.

Lobe Pump and Machinery Company, Buffalo, N. Y.—Illustrated circular of their three types of circulating pumps.

United Motor Corporation, Pawtucket, R. I.—Descriptive circular of the Cameron car, a light air cooled gasoline machine.

The Steel Ball Company, 832 to 840 Austin avenue, Chicago—"The Hill Automatic Starter" (for gasoline automobiles.)

The Steel Ball Company, 832 to 840 Austin avenue, Chicago.—Circular describing Hill's system of air cooling for gasoline motors.



Automatic Tire Inflator.

To pump up a big pneumatic tire on a hot day is a very arduous piece of work, and when a tire fails to hold air and has

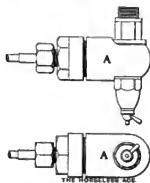


FIG. 1—VALVE FITTING.

to be pumped up every few miles the chauffeur's position is not an enviable one—unless he has a power pump for the purpose. Some private users have fitted such power pumps to their cars, as instanced by an article in this issue. A rather simpler method than using a piston pump has recently been brought out in France, which we shall briefly describe here. The apparatus is known under the trade name "Grip," and is illustrated by the drawings herewith. It consists of three parts, as follows: A valve fitting A about the size of an ordinary spark plug, which is made of pure nickel and screwed into the wall of one of the cylinders; a "purifier" B consisting of a reservoir the size of a grease cup, which is fastened to the dashboard of the car; a small diameter, helical steel tube for connecting the valve fitting and the purifier. To the top of the purifier is fitted a pressure gauge, and near the top of the same may be attached a

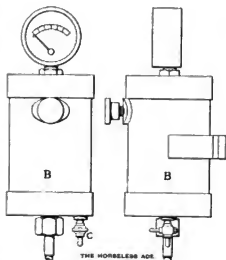


FIG. 2—THE PURIFIER.

long rubber hose for connection to the different tires.

The operation of the apparatus will be readily understood. After a tire has been repaired and is to be inflated, the ends of the long rubber hose are fastened to the tire valve and the purifier respectively. The motor is then started up, and as soon as an explosion occurs in the cylinder the automatic valve in the nickel valve fitting opens and allows some of the burnt gases to pass through this valve and the helical steel tube to the purifier, and from there to the tire. The products of combustion in the cylinder contain a good proportion of steam, and this is condensed in the steel tube and the water collects at the bottom of the purifier, from which it may be drawn off through a cock C.

In inflating the tires the automobilist need only watch the pressure gauge on the purifier and shut off the connection with the cylinder when the proper pressure has been reached. To inflate a 5 inch tire requires about two minutes.

Federal Automobile Law for Germany.

Some time ago the German Government ordered the collection of statistics of all accidents which were caused by motor vehicles within the last two preceding years. The Secretary of the Interior, Count Posadowsky, has now communicated with the governments of the various German states with a view of regulating the automobile traffic by a uniform federal law. All the governments have consented, so that a bill could be drafted which will probably be submitted to the Reichstag at its next session.

The Swiss customs authorities, following the Italian authorities, will hereafter apply to motor cycles with two or three wheels the special tariff charged for bicycles.

The Infanta Maria Mercedes, sister of the King of Spain, was thrown from a motor car while traveling through Arnulfstrasse, Munich, October 9. She sustained slight concussion of the brain.

A combined street sweeper and sweepings wagon, propelled by a 30 horse power De Dion steam engine, was demonstrated before the Paris municipal engineering department a few weeks ago.

In a paper on "Gasoline Engines for Automobiles," reported in the *Gazette Civil*, Mr. Gaillardet gave about 70° pounds per square inch as the best compression, and from 11½ feet to 14¼ feet per second as the best piston speed.

Prince and Princess Andrew, of Greece, after their marriage at Darmstadt on Wednesday, October 7, drove to Heiligenberg Castle, in the Grand Duchy of Hesse,

by automobile. The Prince drove and the Princess Alice sat beside him, both in full military costume. They were accompanied by a chauffeur.

At the last committee meeting of the A. C. F. it was decided to send at once to the German A. C. a challenge for the Gordon Bennett cup.

In connection with the coming Paris show there will be a competition of carburetors, and some of the testing apparatus of the A. C. F.'s laboratory in Levallois Perret is now being moved to the Grand Palais for this purpose.

An automobile exhibition will be opened at Turin, Italy, on January 16 next, and will remain open for a week. It is to be held under the patronage of the presidents of the different Italian automobile clubs, and will comprise sections for motor cars, motor cycles, motor boats and airships.

A Paris magistrate recently decided that an automobile purchaser cannot recover damages for delay in the delivery of the machine, on the ground that the manufacture of automobiles is still in its infancy, and it may be necessary at times to dismount and reassemble a car three or four times before delivering it.

For a while there was a possibility of a rival show being held in Paris this year, some of the largest manufacturers being denied the 800 square feet of space at the Grand Palais they demanded. However, all these demands have now been satisfied. The drawing of lots for the large show spaces took place last week at the headquarters of the A. C. F.

The International Industrial Exhibition which will be held at Vienna from April 16 to May 31, 1904, will comprise a section devoted to machines and apparatus for the utilization of alcohol for technical purposes: (a) Alcohol motors and locomotives and agricultural and industrial machines that can be operated with alcohol; (b) vehicles and automobiles of all sorts that use alcohol; (c) heating and cooking apparatus for alcohol; (d) apparatus for the production of light by means of alcohol; (e) alcohol apparatus for other technical purposes.

The annual Château Thierry hill climb was broken off by rain on Sunday, October 4, and was continued on Monday. The test was over a kilometre, with a standing start, and the gradient is 9 per cent. Rigol, on a 100 horse power Gobron-Brillie, made the fastest time of 45 1-54, a speed of 49 1/2 miles an hour. Duray, on a similar car, was three-fifths of a second slower; while Le Blon (Gardner-Serpellet) did 49 1-54, and Augières (Mors), 54 1-54. Maurice Fournier, on a motor cycle, made a time of 55 2-54, but as he had to start

his huge engine himself, his performance was really remarkable, and his pace at the finish was about 60 miles an hour.

The Austrian Automobile Club has decided to compete for the Gordon Bennett cup in 1904, and probably three racers will be built by the Austrian Daimler Company, of Wiener Neustadt.

Homburg, the well known German health resort, has offered 10,000 marks toward the international automobile race next year. The hotelkeepers will provide a similar amount. The German Automobile Club favors the Homburg course, but it is said that the amount of money offered by competing localities will play a considerable part in deciding the scene of the contest.

The A. C. F. some time ago decided that one place on the French team for the 1904 Gordon Bennett race should be accorded to Panhard & Levassor, while the other two representatives should be selected by an eliminating contest. Immediately there was a flood of protests, it being contended that Panhard & Levassor had lost the Paris-Berlin, Paris-Vienna, Paris-Madrid and the last two Gordon Bennett races and done absolutely nothing during the last few years to justify according it this privilege over its competitors. Now it has been decided that all three representatives shall be selected by the eliminating contest.

A German chemist living in Berlin has composed a preparation of petroleum and ammonia, which is soluble in water, 5 per cent. of which added to 95 per cent. of water will lay and hold the dust of roads down for an indefinite time ranging between four and five weeks, according to the amount of travel over the roads. It can be applied with an ordinary sprinkling wagon, and requires three to four hours of dry weather to "set" it. Rain improves its condition. The cost is less than \$50 per mile for the first, and much less than half of that for subsequent treatments. Non-inflammable, non-poisonous and will not stain. The preparation is called "Westrumeit."

Auction Sale of Automobiles.

W. D. Grand's auction sale of automobiles was held in the Grand Central Palace, New York, on Friday last, and was attended by 500 to 600 people. Fifty-five cars were sold, and Mr. Grand expressed himself as well satisfied with the outcome of this new venture. At times the bidding was quite spirited, but on the whole the prices obtained ranged rather low. As examples may be mentioned the following: A 20 horse power Pope-Robinson touring car, with canopy top and apparently in good condition, sold for \$1,600; a Woods electric runabout for \$145; a Columbia electric victrola for \$210; a Mobile steam delivery wagon for \$155.

MINOR
MENTION



Dealers at Washington are arranging for a race meet on October 28 under the rules of the A. A. A.

H. E. Frederickson has secured the agency for the Knox automobile at Omaha, Neb., and vicinity.

Automobiles are now being experimented with in collecting the mail by the San Francisco postal authorities.

The World's Fair Automobile Company, of St. Louis, have nine electric vehicles in operation on the grounds.

A press report says that J. B. Chapman will install an automobile line from Lawton, Okla. Ter., to the mountains.

The Richmond-Jarvis-Caro Company of Grand Rapids, Mich., will erect a two story brick garage 60x132 feet.

The American Vencer Company have removed from Jersey City to New Orange, N. J., where they have erected a new factory 75x200 feet.

It is stated that the output of the Toledo factory of the Pope Motor Car Company will hereafter be confined to gasoline machines.

The N. A. A. M. has secured 45,000 square feet of space for exhibition purposes and additional space for an office at the Louisiana Purchase Exposition at St. Louis.

Adam Cook's Sons inform us that a number of cars in the Endurance Run used Albany grease for lubrication and that all of these arrived in Cleveland with their axle bearings.

Thomas B. Jeffery & Co. report the following sales of Ramblers from their Boston branch house last week: George P. Merrill, A. H. Barnard and Dr. A. A. Wentworth, of Boston, and George R. Washburn, of Brockton.

An order for an automobile to be built on the same plan as a Pullman sleeper is said to have been placed by the manager of the Reading (Pa.) Baseball Club. The car is to be used in place of railroads for conveying the players from one place to another.

At the annual meeting of the Ford Motor Company, of Detroit, Mich., the following named officers were elected: J. S. Grey, president; Henry Ford, vice president; A. Y. Malcomson, treasurer, and James Couzens, secretary. The three latter, together with John Dodge and J. W. Anderson, were re-elected directors.

The promoters of the automobile meet at Wheeling, W. Va., have awarded cups to Messrs. Mahlike, Colvig, Morgan and List for winning four events. The other events have been declared off. One of the racing machines belonging to Fisher and Kiser was levied upon when they were about to be shipped to Dayton as a result of a dispute over a contract, which called for two

paces of 5 miles each day, but which are said to have been failures.

A Boston newspaper has instituted a guessing contest, and offers a \$1,400 touring car to the most successful guesser.

The second annual Buffalo Automobile and Sportsman Show will be held at Convention Hall, Buffalo, N. Y., March 6 to 12.

Two automobiles were used by the Massachusetts Highway Commissioners this year in their 400 mile tour of inspection of the State highways.

The H. J. Koehler Sporting Goods Company, of Newark, N. J., has opened a branch store at Orange exclusively for the sale and repair of automobiles.

A number of concerns in the automobile accessories trade will exhibit at the Cincinnati show of vehicles, harness and implements at the Music Hall, Cincinnati, November 9 to 14.

Mr. and Mrs. Charles J. Glidden returned to Boston on October 15 after an automobile trip of 6,670 miles, occupying fifty-four days, through fifteen European countries. They left Boston on June 16.

Charles B. Shanks, until recently manager of the Cleveland branch of the Winton Motor Carriage Company, has been appointed general sales manager of the company by the board of directors.

An automobile boulevard is to be constructed from Colorado Springs to Palmer Lake, Col., at an estimated cost of from \$60,000 to \$80,000, of which the Legislature will be asked to appropriate 60 per cent.

The Warner Differential Gear Company, of Muncie, Ind., has been reorganized and the name changed to the Warner Gear Company. The company is building an addition to its plant and installing new machinery.

C. F. Weld, of Mansfield, Mass., claims the distinction of being the first rural delivery mail carrier in New England to make use of an automobile in his work. On Thursday, October 22, he covered 24 miles of his route quickly and satisfactorily in an automobile and he intends to use the vehicle regularly.

The Packard Motor Car Company, of Detroit, Mich., has given a trust mortgage to the Union Trust Company as trustee to secure the issue of \$250,000 6 per cent. gold bonds. The mortgage covers the real estate and old plant at Warren, Ohio, and the Detroit property, embracing the plant and 6½ acres of land on East Grand Boulevard.

Following the example set by the Babcock party, a tour in an electric car from Boston to New York was successfully completed last Saturday evening by H. M. Wilson with a Columbia service wagon belonging to the Edison Electric Illuminating Company, of Boston, and equipped with an Edison storage battery. The trip consumed between four and five days. Night stops were made at Worcester, Springfield, New Haven and Stamford. The battery was recharged at Worcester, Springfield, Hartford, New Haven, Bridgeport and Stamford, all being short charges at a rapid rate.

The vehicle weighs 2,500 pounds, is shod with solid tires and carried only the driver.

Frank P. Illsley, Chicago, has secured the local agency for the Peerless cars.

It is reported that Chicago capitalists will build an automobile factory at Lafayette, Ind.

The Streater Automobile Company, Streater, Ill., is contemplating removal to Kankakee.

Cole & Son, Rockford, Ill., are reported about to manufacture an automobile of their own design.

Stanley Brothers, Newton, Mass., are erecting a new factory with a capacity of six to seven carriages a day. They are also about to bring out a new burner.

The factory of the Packard Motor Car Company, Detroit, Mich., has been completed, and starts up with about 500 hands and an output of three machines per day.

The Chicago Rawhide Company are bringing out a tire puncture band termed a tire sleeve and consisting of a piece of tough, flexible rawhide conforming to the shape of the tire.

Banker Brothers Company, Philadelphia, report sales to F. C. Williams, Germantown, Pa. (Autocar); Robert Whitaker, Frankford, Pa. (White), and Edwin H. Buckman, Chester, Pa. (Stevens-Duryea).

The Flint Automobile Company, Flint, Mich., which has been making gasoline automobiles under a limited license granted by the Licensed Association, and expiring January 1, announces that it will abandon the business on the above date.

A motor propelled potato digger, known as Moulton's self moving potato harvester, has been brought out in England, and attracted considerable attention at the recent Royal Agricultural Show in London. It is driven by a 20 horse power gasoline engine.

E. W. Roberts, consulting engineer, author of the Gas Engine Handbook and other similar works, is fitting up a laboratory at Clyde, Ohio, for the testing of gas and gasoline engines and gasoline automobiles, as well as for calorimetry and analysis of both gas and liquid fuels.

E. J. Cornell, of Havana, Cuba, and party arrived in Boston on Wednesday last, completing a trip from New York in a White touring car and a De Dietrich. They had never been over the route before, and the heavy rains of the previous Saturday and Sunday had made the roads very heavy. The return over the same route was to be started upon today, the 21st.

The Standard Roller Bearing Company, of Philadelphia, have purchased the entire ball business of the Grant Tool Company, Franklin, Pa. (formerly of Cleveland, Ohio.) In order to supply the demand for balls at once the business will be run for a short time in Franklin, but it will eventually be moved to Philadelphia and consolidated with the Standard Roller Bearing Company's plant in that city. R. H. Grant, formerly manager of the Grant Ball Com-

pany, will have charge of the ball making plant in Philadelphia.

A garage will be opened soon at Joliet, Ill.

Efforts are being made to form an automobile club at Quincy, Ill.

William Taylor has opened an automobile storage and repair station at Topeka, Kan.

Massie & Sons, of Quincy, Ill., who have built one experimental automobile this year, will, it is said, go into the automobile business extensively.

Norris M. Mason, of this city, who until recently was United States representative for the Société Franco-Américaine d'Automobiles of Paris, has taken over the business in his own name and has no longer any connection with the Paris firm, but will continue to use its name.

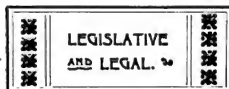
The Fisk Rubber Company, Chicopee Falls, Mass., has made an assignment to A. N. Mayo, a stockholder. The assets are said to exceed the liabilities, so that all creditors will be paid in full. A reorganization will be effected with larger capital to handle increasing business.

The Kirk Manufacturing Company, Toledo, Ohio, manufacturers of the Yale car, have consolidated with the Snell Cycle Fittings Company, same place, under the name of the Consolidated Manufacturing Company, capital \$600,000. The officers are E. P. Breckenridge, president; Ezra E. Kirk, vice president; J. R. B. Ransom, secretary, and A. Wilber Cotter, treasurer.

F. A. Babcock, of the firm of Babcock & Atwater, New York, left Boston Thursday noon, in an electric touring car with the purpose of demonstrating that the run from Boston to New York could be made in four days with an electric automobile. The day following another electric machine supplied with sixty-eight cells of the new Edison storage battery, started from Boston with the same destination in view, and with H. M. Wilson, of Boston, as operator.

New Cleveland Concern.

The entire assets of the General Automobile and Manufacturing Company, of Cleveland, have been acquired by the General Automobile Company, an Ohio corporation recently formed. The stock of the General Automobile Company is controlled by members of the Studebaker Brothers Manufacturing Company, of South Bend, Ind., and its officers are the following: F. S. Fish, president; T. W. Goodrich, treasurer and general manager; G. A. Gaston, secretary. The General Automobile Company will continue to do business at the factory occupied by its predecessor, 1312 Hamilton street, Cleveland. The services of J. T. Dickson as expert and designer will be retained by the new company, and it is proposed to put out for the season of 1904 a medium priced car with ample power for touring purposes.



Restricted License in Massachusetts.

Since the clause relating to experience of the applicant has been inserted in the question blanks sent out by the Massachusetts Highway Commission to those seeking licenses, many unsatisfactory answers have been received. Large numbers testify that they have had no experience at all with automobiles, or, if any, a rather dubious experience. To cover such cases the commission has devised a provisional license having a restrictive clause, as follows:

SPECIAL RESTRICTION.

This license is issued subject to the express condition that the licensee shall not operate any motor vehicle unless he is accompanied by a regularly licensed adult operator.

This restriction will be removed when the Massachusetts Highway Commission is satisfied that the licensee has acquired the requisite knowledge and skill to operate motor vehicles with safety.

By order of the

MASSACHUSETTS HIGHWAY COMMISSION,
Secretary.

Boston, Mass., ———, 190—.

By special petition, accompanied by affidavit that the party holding the restricted license has become a competent operator, a full license will be granted.

The mayor of New Orleans has signed the Moss ordinance regulating the speed of automobiles on the streets of that city.

The first suit in Omaha for damages for an accident caused by an automobile has been brought by Samuel Brown against Henry E. Frederickson, from whom \$1,500 is asked for running over plaintiff on October 3.

The committee on ordinances of the Detroit City Council will report favorably upon an ordinance limiting the speed of automobiles within the three-quarter mile circle to 8 miles and outside the circle to 12 miles an hour and imposing a maximum fine of \$100 for each violation.

The new Fort Wayne, Ind., ordinance requiring automobiles to be licensed went into effect on October 13, and twenty machines were registered the first day. The ordinance provides for numbers $3\frac{1}{4}$ inches high and half an inch wide, in white on a black ground, and also for white lights in front and red lights in the rear to be carried between sunset and daybreak.

The Pope Manufacturing Company has secured an attachment for \$200,000 against the Rubber Goods Manufacturing Company, of New York, for a claim based on an agreement made on November 8, 1899, whereby the plants and capital stock of the Hartford Rubber Works Company, the Indianapolis Rubber Company and the Peoria Rubber and Manufacturing Company were sold to the defendant for an annual pay-

ment of \$200,000 in favor of the American Bicycle Company, which assigned the claim to the plaintiff.

Fines aggregating \$35 were imposed on three automobilists in Washington, D. C., on October 14 for violations of the speed law.

A proposed ordinance in Memphis, Tenn., will regulate the speed of automobiles and impose a tax of \$5 a year upon each of the forty-two machines in the city.

Dr. Charles H. Lemon, of Milwaukee, Wis., has been sued by John Goetz for injuries alleged to have been inflicted by the physician's automobile on June 6.

The tax assessors of East Orange, N. J., have secured from the Secretary of State a list of automobile owners in that town for the purpose of assessing taxes on the owners.

An ordinance approved by the committee on ordinances of the Board of Aldermen of Quincy, Ill., limits the speed of automobiles to 8 miles an hour, and provides a fine of not less than \$10 nor more than \$100 for each violation.

The Common Pleas Court of Philadelphia has refused to open a decree awarding \$7,500 to Daniel Quigley as damages against George L. and Caroline B. T. Lampton for injuries received by being run down by defendants' automobile on April 17.

Mayor Johnson, of San Diego, Cal., has signed the new ordinance fixing the lawful speed of automobiles at 6 miles an hour in the section bounded by B. K. Third and Seventh streets and 10 miles outside of it. Violations are punishable by fines of not less than \$10 nor more than \$200, or imprisonment for not exceeding 100 days, or by both fine and imprisonment.

In the action of Mrs. Louise Johnson against the A. C. A. et al. for \$20,000 damages for injuries sustained during the automobile races at Grant City, N. Y., on May 31, 1902, a verdict for \$5,000 was rendered for the plaintiff on October 19. An allowance of 5 per cent. for counsel fee was made in addition. Trial of the four other suits has been postponed until the next term.

The sheriff has levied upon the factory and contents of the Morlock Automobile Mfg. Company, of Buffalo, N. Y., for \$700 on five executions in favor of the Cleveland-Canton Spring Company, \$234.06; Edward G. Felthausen, \$145.60; Tuthill Spring Company, \$45.60; Atwood Manufacturing Company, \$93.33 and Samuel W. Lambie, \$179.68, and the plant is advertised for sale.

It is declared that the Chicago automobile license ordinance is little better than a dead letter. At a trial of an automobilist on October 19 for illegal speeding the accused said in defense that while he had no doubt the police had correctly read the number on his machine, there were three machines in the city bearing the same number, and that he had a friend who attaches four numbers to his car. The police

are said to have spotted and secured summonses for sixty such offenders.

Walter H. Mitchell, of Morristown, N. J., has brought suit for \$25,000 damages against Henri P. Wertheim for injuries sustained by being thrown out of his wagon, which was overturned by defendant's automobile about one year ago.

Three automobilists from Straight, Pa., were fined \$25 at Salamanca, N. Y., on October 17 for violation of Section 163 of the law in regard to the speed of automobiles within half a mile of a post office. This resulted in injuring five people, and damage suits have been brought against the party by those injured.

W. Leslie Edison, of Washington, D. C., has applied for an injunction to prevent David K. and George F. Joslin from using his name in the firm style of an automobile storage company to be incorporated by defendants, alleging that while he received \$20,000 in stock he finds that the use of his name would injure the business of the Edison Automobile Station.

A resolution has been passed by the directors of the Road Drivers' Association of Philadelphia requesting that the speed laws be rigidly enforced in Fairmount Park against horse and horseless vehicles alike. The preamble declares that automobile owners are agitating the question of running their machines in the park faster than the State law allows.

Club Notes.

A. C. A.

There will be a rendezvous of club members at Minden's Hotel, on Coney Island boulevard, on Saturday, October 31, for an à la carte luncheon at 12 o'clock. After luncheon it is proposed to attend the race meeting of the Long Island Automobile Club at the Brighton Beach race track. Tickets for the clubhouse at the track may be obtained from the Automobile Club secretary.

COLORADO A. C.

The Colorado Automobile Club, of Denver, is planning for permanent headquarters. The accounts of the race meet at Overland Park show a profit and have been approved.

OHIO VALLEY A. C.

The Ohio Valley Automobile Club has been organized at Wheeling, W. Va. William Covig is president and R. H. Hahleke secretary.

A. C. OF VERMONT.

At the annual meeting of the club at Montpelier the secretary's report showed that during the last six months fifty owners had become members, and the treasurer's report a balance on hand of \$61.57, with all bills paid.

LONG ISLAND A. C.

The following races have been arranged for the meet of the Long Island Automobile Club at Brighton Beach on October 31: No. 1, The Lightweight Cup, at 5 miles, for

1,200 pound class; No. 2, The Seaside Scurry, at 10 miles, for 1,800 pound class; No. 3, The Rivals, at 5 miles, for gentlemen drivers piloting their own cars, to be run in heats, the machines of the same make and power to be grouped in one heat; No. 4, The Record Cup, free for all, at 15 miles; No. 5, The Catch-as-Catch-Can, an unlimited pursuit race, free for all; No. 6, The Brighton Handicap, at 10 miles, free for all. In addition there will be a special race open to members only for the club championship, and a 5 mile race for the Manufacturers' Challenge Cup, offered by the Diamond Rubber Company. Among the outside entries noted are F. A. La Roche's Darracq, Barney Oldfield's Winton and the Packard "Gray Wolf."

A. C. OF PHILADELPHIA.

A test case will be made by the club as to the right of townships to pass ordinances fining automobilists for exceeding the maximum speed while keeping under the maximum permitted by the State law. The governors of the club are said to be unanimous in the opinion that the State law superseded all township ordinances. The case of Samuel Bell, Jr., of Philadelphia, who was arrested on October 4 at Radnor, where the ordinance limits the speed to 10 miles an hour, and fined \$12.50, will be made a test. John S. Muckle, vice president of the club, is understood to be in favor of a movement to agitate the passage of a Federal license law by the United States Senate.

NEW JERSEY A. AND M. C.

The New Jersey Automobile and Motor Club has decided to engage counsel to protect its members against unjust damage suits.

RHODE ISLAND A. C.

At the last meeting of the Rhode Island Automobile Club, of Providence, George W. Harris, Albert H. Sayles, William C. Blandy and Fred L. Smith were elected members, and it was reported that the silver trophies awarded at the Narragansett Park meet had been forwarded to the winners.

Entries for the Long Island Races.

Following is the list of complete entries in hand on Tuesday last for the six regular events on the program of the Long Island A. C. race meet to be held at the Brighton Beach track on Saturday next. For the several special races post entries will be received.

"The Light Weight Cup."—Five miles. For stock cars of any motive power weighing under 1,200 pounds: Col. W. P. Harlow, 16 horse power Darracq; W. G. Brokaw, 8 horse power De Dion; F. A. Laroche, 12 horse power Darracq; E. B. Gallagher, 16 horse power Richard; E. L. Blauvelt, 6 horse power Orient buckboard. "The Seaside Scurry."—Ten miles. For cars of any motive power weighing under 1,800 pounds: B. M. Shanley, 40 horse power Decauville; W. G. Brokaw, 30 horse power Renault; Packard Motor Car Com-

pany, 25 horse power Packard; F. A. La Roche, 40 horse power Darracq; E. L. Blauvelt, 6 horse power Orient buckboard.

"The Rivals."—Five miles. Gentlemen operators. Cars to be operated by owner. To be run in heats, cars of same horse power being grouped in each heat: B. M. Shanley, Jr., 40 horse power Decauville; John W. Howard, 10 horse power Howard; W. P. Harlow, 16 horse power Darracq; W. G. Brokaw, 30 horse power Renault; Frank DeK. Huyler, 9 horse power Darracq; Charles A. Carlson, 15 horse power Winton; H. C. Haskins, 24 horse power Panhard; George Watson, 16 horse power Darracq; F. A. La Roche, 12 horse power Darracq; F. A. La Roche, 40 horse power Darracq; E. B. Gallagher, 16 horse power Richard; E. L. Blauvelt, 6 horse power Orient buckboard; Richard Stevens, 20 horse power Richard; C. R. Duerr, 8 horse power Ford; C. H. Tangeman, 16 horse power Fiat.

"The Record Cup."—Fifteen miles. Free for all. For cars of any weight and motive power: B. M. Shanley, Jr., 40 horse power Decauville; John W. Howard, 10 horse power Howard; W. G. Brokaw, 30 horse power Renault; Packard Motor Car Company, 25 horse power Packard; F. A. La Roche, 40 horse power Darracq.

"Catch as Catch Can."—Pursuit race. Free for all: B. M. Shanley, Jr., 40 horse power Decauville; W. G. Brokaw, 30 horse power Renault; Packard Motor Car Company, 25 horse power Packard; F. A. La Roche, 40 horse power Darracq.

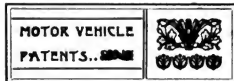
"The Brighton Handicap."—Ten miles. Free for all. B. M. Shanley, Jr., 40 horse power Decauville; Buritt & Co., 16 horse power Decauville; John Howard, 10 horse power Howard; W. G. Brokaw, 30 horse power Renault; Col. W. P. Harlow, 16 horse power Darracq; Crescent Automobile Company, 6½ horse power Cadillac; Packard Motor Car Company, 25 horse power Packard; F. A. La Roche, 40 horse power Darracq; E. B. Gallagher, 16 horse power Richard; E. L. Blauvelt, 6 horse power buckboard; C. A. Duerr, 8 horse power Ford; John J. McMulklin, 30 horse power Daimler; Charles A. Carlson, 15 horse power Winton.

New Incorporations.

Hayden-Croninger Automobile Company, Chicago.—Capital, \$10,000. Incorporators, John A. Hayden, R. Harry Croninger, Charles H. Burras.

Edison Automobile Company of Washington, Camden, N. J.—Capital, \$100,000. Incorporators, Edward H. Chew, Wilfred B. Wolcott and Norman Grey.

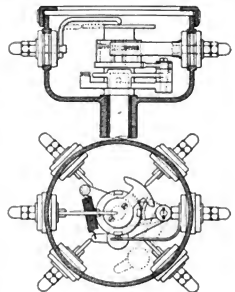
Pittsburg Autocar Company, Pittsburg, Pa.—Capital, \$250,000. To manufacture the Loomis gasoline automobiles at Latrobe, Pa., in the plant formerly occupied by the Star Match Company. Incorporators, Lawrence T. Stevenson, Alexander W. Stevenson, Alexander D. Black, Charles W. Lawson, of Pittsburg, and Herman R. Eckerman, of Allegheny.



United States Patents.

739,882. Sparking Mechanism for Electric Igniters.—Charles B. King, of Detroit, Mich. September 29, 1903. Filed July 15, 1902.

This invention relates to a jump spark commutator combined with a centrifugal governor, the whole being enclosed in a cylindrical case of insulating material. There is nothing new in the construction of the commutator, except that the drum carrying the contacts for both the primary and secondary circuits is free to rotate through a certain angle upon its shaft. Rigidly secured to this shaft is a two armed bracket. To the outer end of one of these arms is pivoted an arm carrying the governor weight and to the outer end of the other bracket arm is fastened a coiled spring, the tension of which counteracts



No. 739,882.

the centrifugal force on the governor weight. To the arm carrying the governor weight is fastened a toothed sector, the teeth of which mesh with a series of teeth on the governor drum. It will be readily understood that when the shaft of the commutator and with it the governor weight rotate at high speed, the latter flies out from the centre of rotation owing to the effect of centrifugal force, and owing to its toothed gear connection with the commutator drum it slightly moves the drum around the shaft, thereby advancing the period of spark.

741,977. Valve Gear for Explosive and Internal Combustion Engines.—Francis M. Rites, of Ithaca, N. Y. October 20, 1903. Filed February 27, 1902.

741,986. Oil Injector for Gas Engines.—Ralph P. Thompson, of Springfield, Ohio. October 20, 1903. Filed January 31, 1902.

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Devoted to
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☞ One week's notice required for change of advertisements.

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Closed Vehicles with Side Entrance.

The design of closed bodies for automobiles has so far received much less attention in this country than abroad, notwithstanding the fact that our climate is considerably more severe than that of France and makes a closed body almost a necessity for country runs during the winter months. The French body builders have evolved a number of designs, but so far none that has quite met all requirements. The limousine, which is essentially a covered tonneau, shares the good features of the latter, but it is objected to by fastidious customers because the entrance must be either in the rear or in front, rendering it unsuitable for city use.

At times when it is desirable to use a covered vehicle the streets are likely to be muddy. Now, there is nothing more disagreeable to a society lady in elegant toilette than to be obliged to step from the car into the middle of a muddy street, instead of directly to the curb or steps. When it is necessary to wade through mud it is impossible to keep the natty shoes clean and pretty to look at, as is most essential when making calls. The front entrance, although it permits of stepping from the carriage directly on to the steps, is more or less dangerous, and, besides, the occupants in alighting risk tearing their clothes or soiling them with grease.

Taking all these facts into consideration, it seems that the ideal closed vehicle for city use during winter should have entrances on both sides, similar to horse driven coupés and broughams. The reason this form of body for city use has not been used to any extent so far is that with the present arrangement of motor, transmission and operating devices it necessitates an almost prohibitive length of wheel base. When the vehicle has a very long wheel base, say over 100 inches, it is impossible to make the short turns with it that are required in vehicles for city use.

But by shortening the motor space and the space between the dashboard and front seat (by passing the steering post through the dashboard) it is possible to build a car of not over 100 inches wheel base in which the side entrances to the rear seat are entirely unobstructed by the rear wheels. The closed body in this case will accommodate two persons. If four persons are to be accommodated the wheel base must be lengthened at least 10 inches.

In the early days the American market for automobiles de luxe was almost entirely monopolized by foreign makers, but of late a few American builders have turned their attention to this field, and have produced cars which in comfort, style and appointments will bear comparison with anything turned out abroad. It is to be hoped that in future the American industry will assume the lead in this line and develop its own styles and types best suited to the conditions prevailing here.

An Important Precedent.

As reported in our last issue, the Richmond County (N. Y.) District Court, during its October session, rendered a decision allowing \$5,000 damages to the heirs of one of the victims of the Staten Island race accident in May of last year, the city administration of New York, which gave permission for the race, and the Automobile Club of America, which organized it, being held equally responsible. This is the first time damages have been awarded for a race fatality in this country, and therefore constitutes a precedent for the guidance of courts in similar cases.

It will be remembered that the two occupants of the vehicle were arrested upon a charge of manslaughter directly after the accident, but were exonerated from all blame by a coroner's jury. In the damage suits the owners and operators of the

machines were made joint defendants with the city and the organizing club, and attempts were made, particularly by the city administration, to shift the blame to the manufacturers of the car, but without success.

It has thus been settled—pending appeal to a higher court—that for accidents to spectators in road races the organizers and the authorities who permit the use of the roads for the purpose are responsible. It is presumable that hereafter the authorities, at least in New York State, will be less disposed to sanction racing on the highway. A move was on a short time ago to obtain permission for a 100 mile race on Staten Island, but we can state on good authority that under the present administration no permission is likely to be granted.

Unsoundness in the Garage Business.

The financial unsoundness and poor business methods which characterized the automobile manufacturing industry in earlier years have of late also become apparent in the garage business. There is certainly little excuse for unsound business methods in this line, in which there is no need of experimenting and which can rely on good, steady patronage if the business is properly conducted. The repair end is frequently under incompetent management, and in many cases such excessive prices are charged for slipshod work that it has become a slogan among users: "Beware of the garages."

Lack of system in the storage department has also been a cause of friction between garage managers and their customers. Recklessness and extravagance have characterized many of these enterprises, and the inevitable results have been failures and changes in management. The recent project of a co-operative garage for New York city reflects to a certain extent the unsatisfactory conditions in the garage business, and the legitimate grievances of patrons.

Preparing for Winter.

As the cold season draws nigh a few words regarding special precautions necessary in the operation of cars in cold weather will be timely.

During the past few weeks we have received a number of inquiries about non-freezing liquids for the circulating sys-

tem of gasoline cars, which have all been individually replied to, but we suppose there are among our readers many novices who will be confronted with this subject during the next few weeks and who will be interested in what has been found the best practice in this respect.

Two solutions are in extensive use for this purpose—glycerine and calcium chloride. The latter is much the better of the two, being much cheaper and also having a lower freezing point, and is used almost exclusively in this country, we believe. It is sometimes claimed that calcium chloride will injure the metal containers, but this claim is unfounded, unless the calcium chloride contains free acid. To determine this a litmus paper, which can be procured at any drug store, is held in the solution, and if acid is present it will turn red. The acid can be neutralized with a handful of lime. The calcium chloride can be bought for about 8 cents per pound, and the purchaser should make sure that chloride of lime is not substituted. A good solution density is obtained by using 5 pounds of calcium chloride to 1 gallon of water. This solution will not freeze above zero Fahrenheit. A proportion of 8 pounds to a gallon is recommended by one authority, but in most cases the weaker solution is preferable, as there is less danger of too much water being allowed to evaporate and of trouble caused by crystals forming in the pipes and preventing circulation. Fresh water should be added frequently to keep the system filled and the solution at its normal density.

Physicians and others who let their cars stand on the street for long periods in all sorts of weather find it a good practice to cover the machine with an oil cloth cover, etc., during very cold weather. This tends to keep the heat in, prevents freezing, and facilitates restarting the motor.

A lighter grade of lubricating oil can conveniently be used in winter, and during very cold spells it may be advisable to thin the lubricating oil by mixing it with kerosene. Trouble in starting gasoline motors during cold weather can also generally be overcome by using a lighter grade of fuel.

The attention of steam carriage users is called to the arrangement for preventing gauges from freezing up described by a correspondent in our issue of June 24 last. It consists in inserting a U tube filled with mercury in the gauge pipe near the

boiler and filling the tube beyond this U with alcohol.

While in a gasoline machine the cylinder jackets are the parts most likely to be damaged by freezing, in a steam car the piping system is the most exposed, and anti-freezing solution, moreover, cannot be employed in steam boilers. In very cold weather the tanks and pipes of a steam car should therefore be completely emptied when it is stored in a cold stable. Draining may also be advisable with gasoline cars under certain conditions, and in either case the owner should make sure that opening the pet cocks really does empty the system completely. Formerly, at least, some cars were constructed with traps in the circulation system which prevented complete drainage, and much trouble has frequently been caused by pumps freezing, etc., when it was thought all water had been emptied out of the car.

Calendar of Automobile Dates and Events.

- November 6 and 7—Race Meet of the Automobile Club of California.
- December 10 to 25—Paris Automobile Exhibition.
- January 15 to 23—Madison Square Garden Automobile Show.
- January 23 to February 4—Brussels Show.
- January 25 to February 6—Meet of the Florida East Coast Automobile Association.
- February 6 to 13—Chicago Automobile Show.
- February 12 to 24—Crystal Palace Show, London.
- February 15 to 20—Detroit Automobile Show.
- March 6 to 12—Buffalo Automobile and Sportsman Show.
- March 19 to 26—Agricultural Hall Show, London.
- March 21 to 26—Washington Automobile Show.

Automobiles in the Campaign.

The automobile was made use of again to a considerable extent during the recent political campaign. In New York city Mr. Devery, candidate of the Independent People's Party, visited some of the boroughs in a motor propelled double decker, from the roof of which he delivered his discourses "touchin' on and appertainin' to" "grait," "the downtrod," etc. The car also carried a band playing the campaign tune "Mr. Devery every, every time." Mrs. Carrie Nation, the strenuous "joint smasher" from Kansas, also accomplished some of her campaign peregrinations in New York city in the interest of the Prohibition party in an automobile.

Detachable Tires of Large Diameter.

By C. WILL TRAVIS.

As 4 inch detachable tires have been very generally adopted as a standard for touring cars, their form, construction and methods of repair are matters of interest to both makers and users of automobiles. The problem of equipping cars of this type with suitable tires, capable of withstanding the occasional excessive strains to which they are subjected, really deserves greater consideration than has yet been given it.

The tires on this class of car have generally been found of insufficient strength, and although the fault does not lie entirely with the tire manufacturers, they are the only ones to whom the users can look for a correction of this evil. The trouble could be readily overcome by the adoption of a standard of weight for each size of tire fully 30 per cent. less than it is now customary to place upon them, and by embossing this standard upon the outside of the casing, together with the size, the maker's name, trademark, etc. If this was done we would not find so many cars of 2,000 to 3,000 pounds weight equipped with tires of insufficient size.

The heaviest tires of the detachable type now manufactured are claimed to be suitable for machines of 2,400 pounds or less, but experience shows that even with two-thirds this weight the margin of safety is insufficient, owing largely to our poor roads. The strain upon the tires is greatly increased by the jolts and shocks on rough and rutty roads, sudden stops, etc.

MOST ADVANTAGEOUS CROSS SECTION.

Much might be said with regard to the advantages of different methods of casing construction, but I will confine myself here to pointing out the effect of the external contour of the casing upon the strength and durability of the tire. The four cross sectional views herewith, of two types of tires, will serve to illustrate my point. The casing shown in Fig. 1 affects the form of an ellipse, and when the weight of the vehicle rests upon the tire it distends the section and gives it a nearly circular form, as shown in Fig. 2. In Fig. 3 is shown a casing which is of nearly circular form when unloaded, and when the weight of the machine is placed upon this tire it produces a flat tread with a sharp curvature at the sides of the tread, as shown in Fig. 4. This curvature is the point of greatest weakness in this form of tire. The great flexure or bending at this point subjects the fabric to unusual strains, weakening the fibres of the fabric and finally producing what is commonly termed a "blow-out." Besides, the friction caused by the great angular movement of the fabric results in much heating, and it is even claimed that the heat thus generated is more harmful than the heat due to friction or slipping of the tread on the ground.

The best results are obtained by adopting a happy medium in proportions. The

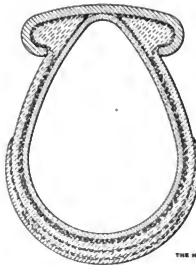


FIG. 1.



FIG. 2.

eccentricity of the ellipse must not be too great—not greater than to cause the casing to assume a circular form when the normal load is placed upon the tire. With a section of this form the strains will be fairly evenly distributed over the whole contour of the casing.

PROTECTION STRIPS.

Protection strips or flaps in detachable tires are not by any means what their name implies, so far as my personal experience goes. On the heavier tires the case will sometimes creep to a slight extent, whether secured with bolts or not, and when this occurs trouble is almost certain to ensue at the valve stem junction with the tube, and the stem may be entirely torn off the tube, as the tube must of necessity move with the casing, while the stem is securely held in the rim. In order to test the practicability of the idea to dispense with the flap entirely, one of the rear tires of a 2,750 pound machine was taken off, the flap removed from the casing and the lug bolts from the rim. The hole in the rim through which the valve stem passes was made $1\frac{1}{2}$ inches long, to admit of the relative movements of the casing and tube being observed. A cotton tape 3 inches wide (commonly used for surcingles in the harness and saddle)

trade) was cemented in the channel of the rim, and the tube and casing were replaced without the bolts. The positions of the casing and valve stem with relation to the rim were then marked on the latter.

The cotton tape (which is very coarse) was used, not only as a protection for the tube from the irregularities of the channel surface, but also to provide a good gripping surface between the tube and a part fixed to the rim. Any slipping of the case would not be so readily communicated to the inner tube, as the tube would adhere to the tape rather than to the smooth lining of the casing, the latter having been given a liberal treatment of French chalk to increase its smoothness.

The first of this series of tests resulted in our coming to a full stop at the end of the thirty-first mile, owing to the bursting of the companion to the case upon which the test was being made. These tires had only been in service about sixty days and had not yet covered 1,000 miles, and as this was the third casing that had given way in precisely the same manner, all being constructed as shown in Fig. 3, it was decided to postpone further experimenting until a pair of tires could be obtained embodying the idea advanced in Figs. 1 and 2. The test was then continued, and 1,500

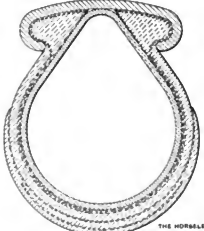


FIG. 3.

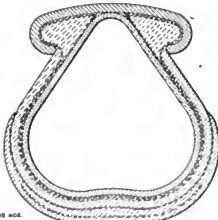


FIG. 4.

miles running proved conclusively that the tube would retain its position without straining, though the casing continued to creep beyond the limits of the elongation of the valve stem hole in the rim. On the other hand, the tire not thus treated continued to give more or less trouble, until finally this one was fixed in the same manner.

As there is no way of knowing exactly what strains are being placed upon the tube at the valve stem, it is suggested that the car be run backward a little more frequently than is actually required, which may in a measure relieve a strain that would otherwise be set up.

REPAIRS ON THE ROAD.

Very little can be done in the way of repairs on the road with the larger sizes of tires. In the case of a puncture the speed and weight of the car will often cause serious damage to the tube, and probably the casing, before it is detected and the car is brought to a stop. If the trouble is entirely with the tube, and is nothing more than a puncture, the application of a small patch or the insertion of a spare tube is an easy matter, but should the casing be badly cut or torn and a substitute is not at hand it is advisable not to waste time in trying to make a repair, but to remove the tire entirely, and if a rope of good size can be found it will make a good substitute by filling the channel with it, winding it on in the same direction as the wheel turns—in other words, if the end of the rope is placed at the top of the wheel, the length should be carried to the front end of the car and wound on by revolving the wheel backward. If nothing else can be done, continue on the rim at moderate speed to the nearest place where a permanent repair can be made.

An old single tube bicycle repair trick may sometimes be of service in connection with detachable tires on automobiles. On one occasion the tube in the repair outfit supposed to contain the patching cement was found to be empty when most needed, evidently having burst and the contents evaporated. A lady suggested chewing gum as a substitute, but several previous experiences had shown it to be unavailable for this purpose. Two three-eighths inch washers and a one-eighth inch machine screw and nut were the only appliances in the tool and repair kit that were likely to solve the problem of repairing the tube, and as the tube was unusually heavy the scheme was worth a trial.

The washers were first cupped a little with a punch by placing them on a piece of wood. One of them was then placed on the screw with the cupped side to the nut end, and the screw head and washer were forced to the inside of the tube, with the threaded part of the screw protruding. Some little time was spent making a new start, owing to the loss of the screw and washer in the tube, but as things were becoming more and more interesting as to the final outcome of the improvised repair,

this otherwise vexatious delay was hardly noticed.

The screw and washer were soon back in their proper places. The second washer was placed upon the screw with the concave side toward the tube and the nut put in place. At one time it looked as though it would be necessary to cut a hole in the opposite side of the tube so a screw driver might be inserted to hold the head of the screw from turning with the nut, but the head finally held in some unexplained manner and permitted the nut to be sufficiently tightened to draw the washers closely together. The part of the screw protruding through the nut was then cut off and filed down flush with the nut; the casing was put back and the pump again put into service (no sinecure at 90 degrees in the shade) and our interrupted journey resumed. Strange to say, it was not until a more serious accident occurred to this tire that there was any occasion to remove it. The nut had worn a depression on the inside of the casing, but the impromptu repair was found to be intact and perfectly airtight.

Automobile Wheels.

(Paper Presented to the Second International Automobile Congress by Commandant Ferrus, Condensed.)

The author believes thoroughly in the necessity of dishing and camber (inclination of the axle spindles), at least with wood wheels, and if at the congress of 1900 he expressed the opinion that in automobiles these two factors should be reduced, it was because he did not see any way for automobilists to avoid this necessity if they wanted to secure at least fairly satisfactory operation of their chains and differential gear.

WOOD AND WIRE WHEELS COMPARED.

During the last few years the superiority of wood wheels has become more firmly established, and at present automobile manufacturers only have recourse to the latter when they find it necessary to reduce the vehicle weight to a minimum, or in the case of very light vehicles, for which the disadvantages of this type of wheel are less important.

The great fault of steel wire wheels is that they do not possess the requisite strength in a transverse direction, and that they are buckled too easily when subjected to transverse shocks, as, for instance, in striking a curb or rut after a skid, and particularly when subjected to the influence of centrifugal force in taking a sharp turn at high speed. In the latter case the resistance of the rim does not come into play, as in the case of wood wheels suitably dished. The structural strength of wire wheels depends entirely on the continual co-operation of a large number of elements, each one quite weak by itself. The consequence is that if the wheel is strained in an irregular manner, these different elements may readily break one after another, even though their combined strength

would be more than sufficient if they took the strain all at the same time.

WOOD WHEELS.

The type of automobile wood wheels has not changed to any extent; on the contrary, these wheels are approaching more than ever toward the classical type of wheel, which is characterized by a certain amount of dish, tenoned spokes and a metal hub. Wood hubs are unsuitable for automobile wheels.

In general, wood wheels are manufactured by specialists, the manufacture necessitating a knowledge of the manufacturing processes and special experience, and particularly a large stock of well seasoned wood. The wood for spokes must be seasoned for three to five years.

Wood wheels are generally manufactured in the following manner: The hub is made of steel of from 65,000 to 70,000 pounds per square inch of tensile strength, experience having shown that bronze hubs offer very little resistance to violent lateral shocks, such, for example, as those the wheel is subjected to when it strikes the curb in skidding. The steel hub is provided with a bronze bush.

The spokes are of hickory or acacia. After long discussions concerning the superiority of hickory wood of high quality (good hickory is relatively rare and expensive), it is now recognized that, weight for weight, this wood is superior to all others, acacia included. The superior qualities of hickory wood are particularly due to the length of its fibre. Hickory wood may break, but it practically never tears, so to speak, the broken parts not separating from one another. It is not at all rare, for instance, to see the spokes of a vehicle after a serious accident, such as running into a tree or wall, all broken at the part where the bolts securing the driving sprocket pass through them, without showing an absolute rupture. With spokes manufactured from any other wood, a certain number are always completely broken apart in such a case. The use of hickory wood for the wheels of racing cars seems, therefore, not the result of a prejudice, as it has sometimes been claimed to be. It is well to add that acacia gives generally satisfactory results.

The rims (felloes) of wood wheels may be manufactured of hickory, acacia or ash. In most cases they comprise two semi-rims, suitably fastened together. Upon the wood rim is secured the steel rim which receives the pneumatic tire.

The manufacture of wood wheels is effected entirely by machinery. The spokes are made in spoke machines, and their tenons, stubs and enlargements are also made by machine operations, which insure perfect uniformity and facilitates their assembling. When the various parts have been finished the wheel is at once assembled and the steel rims set, so as to avoid all production of play in contact with the air.

The rims are set hot. Setting them cold

has generally been abandoned, as it sets up internal strains and results in more frequent breakages. With hot setting the wheel will better retain its circular form, and the greatest objection to hot setting has vanished since the rims are welded electrically, which prevents injuring a brazed joint. Caution is necessary, however, not to heat the rim too much, to avoid carbonizing the fellos too much, and start a decomposition which renders it imprescribable. The shrinkage allowed in the rims for wheels of the usual sizes is eight-tenths of an inch. This shrinkage produces a pressure on the shoulders of the spokes, which shoulders must be of sufficient surface to take up this pressure, and all exactly alike, which end is readily secured with machine manufacture. Care is taken not to allow the rim to rest on the end of the tenons, experience having shown this to be a cause of irregularity in the distribution of pressure and of splitting or cracking of the spokes.

For the same reason, it appears, the use of metal sleeves for fastening the spokes to the fellos has been abandoned in automobile wheels. This method of construction has nevertheless given good results, particularly for wheels serving simply as carriers, as shown by the example of the German artillery (Krupp wheel). It is true that the form of the sleeve in the German type of wheel, which surrounded the rim, is considerably different from that which was employed for automobile wheels.

The spokes of wood wheels must be provided with an enlargement between the rim and the hub to receive the bolts by which the driving sprocket is supported. As to the tenons which form the outer ends of the spokes, they must be of a sufficiently large cross section to withstand both the transverse flexure produced by the setting of the steel rim and the propulsion effort transmitted from the motor. It is, however, very rare for a tenon to break; and it practically never occurs except with wheels which have been overstrained by long use without pneumatic tires, in which a part of the wood felloe is sometimes broken away.

DISHING.

The dish given to the wheels—that is to say, the inclination of the spokes to the plane of the rim—is most frequently 5 to 6 per cent, but may be as small as 2 per cent. It is, moreover, generally different for front and rear wheels. At the present time the discussion concerning the advantages and disadvantages of dishing is still being continued, and it is therefore not without interest to say a word concerning this question.

The dishing has practically only one disadvantage—that it interferes somewhat with the proper operation of the chains and the differential gear. But this disadvantage is of sufficient importance that it has frequently been proposed to do away with dishing entirely. We believe, however, that this would be an altogether ill advised step, at least in connection with

wood wheels. The essential object of dishing is to transform the wheel into a conical surface, a sort of arch, which gives the assembled wheel its elasticity and strength. The elasticity is due to the fact that when the rim is set the spokes bend slightly under its contraction. It is true that the elasticity thus produced, which is absolutely indispensable in steel tired wheels, is much less so in wheels pneumatically tired, being insignificant in comparison with the elasticity of the tires.

The strength of the wheel depends upon (1) the solidarity between the dished spokes resulting from the setting of the steel rim; (2) the constancy of direction given to the destructive efforts on the wheel by the dishing, and (3) the conical shape of the wheel.

The same as a sheet of paper when rolled in trumpet form will support a considerable weight without collapsing, a wheel properly dished presents a very high resistance to the forces which tend to crush the wheel by forcing the centre through outwardly. In order that a wheel may be crushed in this manner, it is necessary either for the steel rim to give way or the spokes to break by compression.

The action is entirely different, however, in a "plane" wheel, in which there is no action of the steel rim opposed to any lateral destructive efforts on the wheel. The only resistance opposed to lateral efforts on such a wheel is the transverse shearing strength of the spokes. If one desires to gain an idea from practice of the really extraordinary strength of wheels resulting from the dish of the spokes, it is only necessary to observe the street omnibuses of the Compagnie Generale and note the violence of the shocks to which they are subjected when the vehicles (the weight of which always exceeds 4 tons) strike projecting street car rails, causing them to skid, or run into the curb, as often occurs on steep down grades. One then feels inclined to ask how it is possible that these wheels, with their relatively fair appearance, do not get wrecked oftener. Only the strengthening effect of dishing can explain this fact.

The same favorable conclusions regarding the effects of dishing are reached by observing artillery vehicles being run at high speeds over rough, uneven ground, through ditches and ponds, into which the wheels drop abruptly, and colliding with curbs and milestones.

Of course, automobiles are ordinarily not exposed to the same shocks as the omnibuses of the Compagnie Generale and artillery vehicles. However, it happens only too often, particularly in Paris, that they skid against the curb. Racing cars, on the other hand, are subjected to many severe knocks and unforeseen strains, particularly in negotiating curves at high speed, where the considerable pressure due to centrifugal force is added to accidental shocks and skidding.

We believe, therefore, that dishing in

automobile wheels, if it is an evil, is a necessary evil, at least with wood wheels. It is quite evident that with disk wheels and pressed metal wheels dishing is not essential to strength. However, under certain circumstances the combination of dishing and camber (axle inclination) presents advantages even from the standpoint of rolling motion.

It is known that for ordinary vehicles, those with plain wheel bearings, the use of dished wheels necessitates the use of axles with inclined spindles. When the dish and camber are suitably proportioned the lower spoke of the wheel, which carries the maximum weight, stands practically vertical. It is easily seen that the effect of the camber on an uneven road is not to entirely obviate, but to diminish the tendency of the wheels to move outward from the axle shoulder, which, of course, decreases the draft. It is, of course, understood that we are here considering the case in which the vehicle follows the middle of the road, as is common usage, although it is contrary to the law of the road. On the other hand, when a vehicle is being driven on one side of the road or on absolutely level ground, the camber slightly increases the draft. All old, experienced drivers know that for minimum draft the wheels must play slightly back and forth on the axle.

The dish of the wheels and the conical form of the spindles (if this form be used) produce analogous effects, which are to give the wheel a conical motion when the rectilinear progression of the car demands a cylindrical motion. This conical motion results in a certain amount of extra friction, which with steel tires leads to a rapid transverse rounding of the tire surface. This effect is so well known that Dupuit in 1837 proposed to make the rolling surface of steel tires of elliptic form. In England, and particularly in the English artillery, steel tires of curvilinear cross section are in actual use.

The question of the influence of camber on the draft of vehicles is, moreover, much more complicated with strongly conical spindles than with cylindrical spindles. When the vehicle is in motion the spindle does not rest at the bottom of the box, but contacts with the box surface forward of the bottom line (carrying wheel). The result is that with conical spindles, not the bottom generatrix, but a generatrix forward of the latter forms the line of contact and of sliding motion, this line being downwardly and rearwardly inclined from the inside toward the outside. The rearward inclination results in a divergence of the wheels toward the front, which may be corrected by giving the axle spindles a slight forward inclination or camber.

A similar effect is produced even with cylindrical spindles, owing to the slight rearward flexure of the spindles when the car is in motion, which results in spreading of the wheels. This phenomenon is so

well known that the General Omnibus Company gives the spindles a slight forward camber rather than leave the horizontal spokes absolutely parallel. In a general way, whenever the spindles are given any camber precaution must be taken to prevent the axles from slightly rotating toward the front or rear, as otherwise the wheels will spread one way or the other. By neglecting this precaution, a trucking company which hauls the coal for one of the larger railroads, when attempting to improve the running qualities of its coal wagons by providing them with springs—a perfectly rational proceeding—obtained no other result than a considerable increase in draft; the axle, which was provided with inclined spindles, when fitted with springs made a slight forward rotation as soon as the vehicle was set in motion, resulting in the spindles diverging toward the rear and the wheels spreading in the opposite direction, thus causing the vexatious increase of the draft.

It is to be remarked that in motor propelled vehicles the forward wheels always tend to spread in front, and the rear wheels in the rear. In fact, the forward wheels being carriers only, the axle spindles tend to climb the front side of the bearing boxes, which results in rearward flexure of the spindles, while the rear wheels, being drivers, push the axle, which climbs the rear side of the bearing boxes, causing the spindles to bend forward.

Generally speaking, the most varied combinations of wheels and axles are found in automobile practice, from wheels with 5 to 6 per cent. dishing used with spindles of 3 per cent. camber to wheels of 2 per cent. dishing used with straight spindles. It is to be noted that in the latter case the vehicle seems to have a negative camber, which gives a singular aspect to the wheels when looked at from the rear. The camber generally does not completely compensate for the dishing, and the spokes under greatest compression strain, therefore, do not occupy a vertical position. Fortunately, these spokes are protected from shocks by the pneumatic tire, the elasticity of which is such that the inclination of the spokes does not seem to present any particular disadvantages.

(To be concluded.)

Messrs. Betts, Betts, Sheffield & Betts have been retained as counsel by the A. L. A. M. in their suit against the Ford Motor Company.

LESSONS OF THE ROAD

To the Summit of Mount Washington in a Runabout.

(Continued.)

By T. P. DRIVER.

We left promptly, receiving good-bys from the visitors, and when fairly started my companion remembered that he hadn't received any change from the \$5 bill given for a telegraph message; so we stopped and he went back. After a delay of five minutes we made a good start and kept a sharp lookout for a team which had left the Halfway House. This information was given P. on his trip back for his change. We finally sighted the turnout, a four horse, three seated mountain wagon, with five passengers, four of whom were walking, as they were on one of the steep pitches. This sight rather comforted us, as we, too, had been obliged to walk.

We made the Halfway House in fifteen minutes' running time from the Summit, but it seemed an hour, for the water bars came often and were of good size. We had to wait and keep Mr. Wheeler company until two teams that had started from the Glen arrived at the Halfway House. This delayed us about an hour, when we once more started on our descent. Mr. Wheeler taking the time. The method I used on the descent was to start the motor, and when sufficient headway was gained on the slow speed I threw into the high speed and then cut off the spark. As the speed increased I pulled back onto slow speed, but not into it, and only as much friction was kept on slow speed as was necessary to hold us, for I didn't dare to make a hard and fast connection to the slow speed, owing to the strain on chain, etc., on going over the water bars. I pursue this method of suspended ignition upon every opportunity, and very seldom use my brake at all. I don't think I threw any pressure on my brake more than two or three times during the entire descent.

As we shot past the 3 mile mark I tried the horn, but with no success: every little while I tried to get a squeak, and finally, just about as we flew past the 2 mile mark, my efforts were rewarded with first a little squeak and then the hoarse honk. In a short time we were in the intervals with

ignition resumed and slow speed changed to high, then back on the bridge and up the sandy rise to the Glen stables, the same rise that faced Bill only the night before. It did not bother him now, for he was getting a full breath of solid air.

The stable man at the Glen called up the Halfway House and comparing time found that we had dropped down in just seventeen minutes. This made him stare at us, and at Bill, but we were all there safely, and at no time was the machine out of control, for every part of it held as it should. Although the time was so short in actual minutes, it seemed at least an hour to me. On the way down a few lines of Tennyson's "Moaning of the Bar" kept flitting through my mind, and I thought how grand it would be for me to write a poem when I got home (I was too busy then) about water bars; but don't be alarmed, reader—I have given up the idea, but will start somebody else in with my first line and thought: "May there be no moaning of the car when it carries me."

The front axle had never had a brace on it and became slightly sprung. This did not bother us any, but since getting home I have straightened it and added a brace, which will probably never again be necessary, for I don't believe in tempting Providence but once in the same way.

We had made the ascent in three hours and forty-five minutes, total time, including twelve stops. I don't know the exact running time, but probably it was a trifle over an hour, as the gear on the slow speed would be about 8 miles an hour the way the motor was running. The descent was made in thirty-two minutes, but then anything will roll down hill, even a barrel. We had used 5 quarts of gasoline up and down, but I could not see that any water had disappeared, and we paid no more attention to that during the trip.

We had dinner at the Glen House after washing up. Paying our bill and packing, we started for North Conway at 1:45. It was Sunday afternoon, and consequently every horse in the surrounding country seemed to be out, and we made stop after stop. It was very warm in the Glen, and the sand, which was hot and dry, seemed very deep. We plodded along with lots of slow speed work, and made North Conway at 4:15 p. m. Here we returned the extra gasoline can to the laundry man, took a little rest, and huff-puffed for Conway. From there we journeyed on through Albany and Iona, at which place we met



A MILE BOARD



SOME ENCOUNTERS WITH NERVOUS HORSES ON THE RETURN TRIP.

the worst-acting horse of the entire trip. The driver said he could handle him, so he passed us and then tried to drive up to Bill, but from the looks of things I was afraid someone would be injured, so I took my first chance and left him.

We entered the Chicorna region just at sunset, and the sight was glorious, but we were soon brought down to the stern realities of life by the approach of a four seated mountain wagon drawn by four horses. We stopped away out to one side and P. went up in a solemn manner toward them without speaking, for we were getting tired and so used to this proceeding that we supposed everyone else understood it. These people looked alarmed and showed every sign that they thought they were being held up. As soon as I perceived this I explained matters, much to their relief. I didn't much blame them, for we were as dusty looking pups as ever made a hold-up. Once more we resumed our way, and with no more trouble we soon reached the Piper House, where we spent the night.

We arose at 5 o'clock and spent an hour and a half looking over Bill, and changed over to short lift on inlet and mixer. I had to tighten up quite a number of bolts, and we put in 3 gallons of gasoline from our spare tank. We had breakfast and started at 7:30 for Dover, P., leaving his camera lying on the grass by the barn, but has recovered it since getting home. We had a good run down through the Ossipees and Wakefields, with now and then a team and several bunches of cows and school children at recess, the cows seeming to be at recess also, for they acted more frisky and foolish than the children did.

We stopped voluntarily to get water from a good well and came down through Milton, after which we got sand most of the way to Rochester. It was very hot and dry (93° in the shade when we reached Dover), and we had hard work following in the wheel ruts, owing to the fact that our sprung axle made the steering gear



SUMMIT OF MT. WASHINGTON, FROM THE EIGHTH MILE.

work hard. This I would have fixed if I had wanted to take the time or if I was to have been out another day. We bumped into Rochester just at noon, having had a race on the outskirts with a horse whose driver gave us passageway and then tried to keep up with Bill. We made the race as short as possible, for there was sand and a narrow road ahead, and, besides, a man ought to know more than to put a horse to such a test on a hot day. Then we encountered sand and more of the same, but finally reached Dover at 1 o'clock, on schedule time.

I had been hearing a little unusual noise down in Bill's vitals and upon glancing in saw the small starting chain had separated and was resting down on the half speed worm gear. It was fortunate it didn't catch and go around once or twice, or I should have to change this story of good luck. We

got 3 gallons of gasoline and had the link put in the starting chain while we were at lunch, and incidentally I might note the fact that somebody got away with my rain coat and two pair of glove gauntlets, but what better could you expect of Dover, where the mills have all been shut down on account of the high price of cotton? I wrote the police department of the fact, but I guess they don't keep open in summer, for I haven't received an answer, and they can keep the stamp for city business.

We left Dover at 2 p. m., and decided to take the straight road through Newmarket, Exeter, Newton and Haverhill. We were very much pleased with the condition of the road, and I think it showed more genuine improvement during the last ten years than any I passed. After leaving Newton we got mixed up with more cows, the teams not having bothered us



SUMMIT HOUSE FROM GLEN ROAD.



JACKSON FALLS ON WILDCAT RIVER, JACKSON.



THE SUMMIT.

since leaving Dover. I thought these cows would surely smash up Bill, as they would go along ahead and then suddenly throw in their emergency brake and reverse plumb in front of us. Finally, after running them about a mile, we got ahead and made Haverhill at 5:30 p. m. We passed directly over the bridge across the Merrimac and were off for the Andovers, with more sand, to which we were becoming well used.

We plugged up the hill in Andover, and to our dismay saw there was ahead another mile of Bay State road under construction, so we had to bump along in the electric car track over the sleepers. As the next 7 miles were all Bay State road, and a general down grade, I decided that we might burn a little wind, and we covered this distance in twelve minutes, and were not "all in" either, for I heard some noises in Bill's works that disturbed me. I just let him slide on about half throttle and very much advanced ignition.

We had to stop at Reading to light up, and then started again, nearly striking a dog while slipping right along, but luck was with us again, for the old hound just cleared us and we made Melrose at 7

o'clock, thus agreeing with our scheduled me once more.

When I blew the horn all the youngsters in the street gathered and welcomed us home. I am popular with the boys, for I let them watch me when at work on my machine, and occasionally ask them to hand me some tool when I am in a prone position, after which they usually become so interested that they get their elbows in a can of graphitolio. Their mothers have ordered them not to visit me on this account, and to the maternal ban I lay the most claim to popularity, for where a boy is commanded not to go there he is sure to go. At least that is the way it was twenty years ago as I remember.

I have demonstrated with my own and others' satisfaction that a 4 horse power runabout can be successfully used for touring over hard and hilly roads with comfort and economy. This is not by any means the first trip I have taken, but the hardest and one in which fast and long runs were made over uncomfortably rough roads. As a genuine pleasure trip I would advise taking double the time, or seven days instead of three and a half, 50 to 80 miles being enough for a day's ride for pleasure.

We used 18 gallons of gasoline, 2 quarts of oil for cylinder and transmission, and a quarter of a pound of grease. We ran about 400 miles, and our entire expense, including everything we bought on the road and our hotel and toll bills, was \$16.25. We started with 7 gallons of gasoline and the oil and grease, which are not included in the above amount.

The tires were not pumped up during the trip, only 2 quarts of water were put into the tank, and I had to put in only 1 gallon when I got back to fill the same. The water system holds 3½ gallons, and can run on 2 gallons, so we had one-half gallon over minimum after the trip, although the weather was uniformly hot, ranging from 85° to 94° at midday during the entire time. Every day was fair, and the general condition of the roads was dry and considerably cut up, while many stretches bore testimony to the fact that taxes are due November 1.

We made sixty-nine stops for horses in which the engine was stopped and in at least fifty of these cases the horses were led by the auto. Everyone treated us with consideration, and we were thanked many times for our trouble in assisting frightened horses.

Bill Jones has been in commission ever since. The sprung front axle has been straightened and a brace added, with no other repairing necessary. Within a week from my return, with about an hour's general inspection and tightening, I took three companions, with guns and my fox dog Prince, down into the country 18 miles for hunting. We made the run in one hour and ten minutes, and luck still followed us, for we got a fox, but that is another story.

I will close this little narrative, hoping that my readers will not complete its reading as tired as we were when we reached home—and also that some may be induced to use their runabouts for touring.

Conclusion.—Runabouts can be used for touring. Q. E. D.

Twenty-five Hundred Miles in a Touring Car.

(Concluded.)

By C. H. GILLETTE.

At this farmhouse occurred, also, the memorable incident of the chicken.

Not that this was the first fowl we had killed—nor the last during the trip, for that matter. It flopped out right in front of the car as we raced for the barn, ran under the wheels, was thrown into the road, squawked and gave up the ghost.

What was memorable about the incident was that the housewife refused pay for the lost broiler. We could scarcely believe the accuracy of our ears when she refused.

"She wasn't much of a pullet, anyhow," said the hospitable farmer's wife.

Our next day's run, from Albany to Utica, was a long one, a little over 100 miles, but we found fairly good roads and had no grade to hold us back. The first town of importance was Schenectady. Then came Amsterdam, Fonda, Fort Plain, Little Falls and Herkimer. From Utica to Syracuse was an easy run—just 50 miles—so that we made up our minds to start very early and try to reach Rochester the same day. This was a run of 130 miles from Utica. We left about 7 o'clock in the morning and got into Rochester with an average of a little more than to miles an hour. It was nearly midnight, but we did not mind that, inasmuch as we had been successful in covering a long day's run without a mishap of any kind, and in good average time. The next day, Sunday, was spent in Rochester.

Rochester to Buffalo was a comparatively pleasant trip. We took the road by way of Batavia and Crittendon, reaching Buffalo in time for dinner at 7 o'clock.

No one who ever goes to Buffalo will leave it without running over to Niagara. It is a short trip of 22 miles in a car, by way of Tonawanda and La Salle, over good macadam and pavement roads. There is no reason why we should tell what we saw there—there are so many better descriptions than I could possibly write about it. We spent the morning from about 7 o'clock until noon in going there and back.

About 2 o'clock we started out for Genesee, by way of Batavia, Le Roy, Caledonia and Avon, making in all about 35 miles. We got over in time for a late dinner and an early bed. We were thoroughly satisfied that we had spent one of the best days of the trip, especially the little side run to the Falls.

The next morning we started out with the purpose of trying to get to Elmira by nightfall. We had gone as far as, I think,



GODRICH FALLS, JACKSON.

Avoca, having passed successfully through Mt. Morris, Dansville and Cohocton, when our supply of gasoline suddenly seemed to have disappeared. We procured some, after quite a search, from a hardware store and proceeded on our way. We had passed through Bath and reached a point a few miles beyond Savona, late in the afternoon, when the motor stopped, and no inducement on the part of Frank could make it budge. The sparking plugs were examined and found to be all right. We looked for a short circuit and found the current in good shape. After we had potted around the engine, looking for all sorts and kinds of mishaps that could have occurred, begreasing and begriming ourselves beyond the recognition of our most intimate friends, Frank conceived the idea that the trouble lay with the carburetor. Upon examination we found that the carburetor was stopped up, and traced this to dirt in the gasoline. Since we were several miles from the nearest town, we had to start Frank to work cleaning the carburetor while we drew out the gasoline and strained it through our handkerchiefs, for want of better material. Two hours later we landed in Corning, for the night, with everything running in good order. We found that we could not get to Elmira in time, so we decided that we would remain in Corning.

The next morning was cloudy and dreary and it looked very much as if we were going to have rain for the greater part of the day, if not for all day. Fortunately the roads ahead of us turned out to be good ones, and unfortunately the promise of rain came true. The drops fell pretty steadily, and by the time we had reached Owego, going through Lowmanville, Waverly and Nichols, we had pretty nearly enough of this kind of weather.

Binghamton having been reached and our 60 mile run being over, the rain very condescendingly stopped. We were in the dumps all the evening and were glad of internal and external ablutions and to retire early. Frank suggested the next morning that we make for Kingston as our next objective; it was a long run, but we might be able to make it. He explained that there were some good roads on this route, and he prophesied that this route would eventually become the main highway of the New York-Chicago route, instead of by way of Albany and Utica. His suggestions were overruled, because we did not want to go back to New York until we had finished the whole tour.

We set out early for Scranton by way of Conklin Center over the State line to Montrose, Pa. Just beyond this town we had an exciting race. We exceeded all legal limits of speed in our eagerness to outdo the other fellow. The other was not an automobile, but a bull, evidently being driven to market. Just before reaching the fork in the road the bull was on the other side of the fork, and objected to our tooting the horn by cutting up capers and

breaking loose from his leader—a true country bumpkin. Then he made for us. Our car was painted red and he had a broadside view of it. Probably the color unsettled him as much as the horn. It was a race for the crossroads. If he got there first there would unquestionably be a dead bull and a damaged automobile. If we got there first it was only a matter of continuing on third speed till the bull was distanced. Our good fortune was to get across the roads first, and then there was a lively chase for about 1 mile. I do not mean to say that the bull had any chance of catching us, but he surely knew how to run. The last we saw of him was just before reaching a bend in the road. His leader, the astonished farmer, was somewhere in the dim distance. This is about the only event that we noted on this day's run except that the roads were not of the best and had a few bad hills. We went from Montrose by way of Nicholson and Dalton to Scranton, the total distance for this day being 65 miles.

The next day's run was only 50 miles, but it was eventful. In fact, it was the only road that we as yet struck that was uniformly hilly, and we scarcely made more than 8 miles an hour. Toward the latter part of the day's run the hills became a little less pronounced, and we put up at a well known resort at Delaware Water Gap for a night and a day. We had gone through Daleville, Tobyhanna, Mt. Pocono, Bartonsville and Stroudsburg. There ought to be another route than this one to Delaware Water Gap from Scranton. It is not pleasant, by any means, to bump along over bad roads and puff up steep grades, with only other grades to come.

About 9 o'clock Monday morning we started for Easton, intending to go from there to Trenton for a night's stop. We successfully got over the road to Easton by noon, in time for lunch in Easton. We went out of South Third street, through Kintnersville to Frenchton, Plumbersville, Pa., and Lambertville, N. J., to Trenton. The material and condition of these roads were only fair, but with the exception of one spot they were almost as level as a board. This was only a short run of 50 miles.

In looking back over our record of day's runs, I found that we had been making less and less, on an average, as we went along from day to day. I figured that we were getting lazy, and perhaps somewhat tired of the trip. I suggested this to Smith. He came back with the suggestion that we ought to "hit it up a bit."

From Trenton, the next morning, we reached Philadelphia—a very short run of only 40 miles. The route is on the New Jersey shore of the river by way of Bordentown, Burlington, Riverside and Camden, where the river is crossed to Philadelphia.

Were it not for the fact that we wanted to spend a few hours in Philadelphia, we should undoubtedly have struck out for

Lancaster, 67 miles away, on the same day. But the next day we started out through Bryn Mawr, Malvern and Coatesville to Lancaster. The roads are very good for the best part of the way, but gradually grow poorer and hilly, except for the run into Coatesville, which is level. We had heard a good deal about the poor roads around this part of the State, and expected that our next day's run would be a rough one. It was 70 miles of good rolling hard dirt road, and really an agreeable disappointment. It runs through Columbia, York, Hanover and Littleton to Westminster, Md. But the next day, when our hopes were at their highest, we had a lively time reaching Baltimore by way of Owings Mills and Pikesville. Since the distance to Baltimore was only 32 miles, we concluded that we had better set out for Washington the same day, and arrived in the capital about 8:30 p. m. We passed through Catonsville, Elliott City, Olney, Leesboro and Brightwood to Washington. Of course we did some sightseeing in Washington, as most strangers do, but we had not much time, and the next morning, though rather late, we started back to Baltimore on another route which we were advised to take. We wished we had refused the advice. We passed through Hyattsville and Vansville, and continued through Laurel and Elk Ridge to Baltimore. During the course of the evening and the Sunday which followed, we decided upon our itinerary for the rest of the tour. We set down first Philadelphia then Atlantic City, then Lakewood and then New York, which we calculated would take about four days more.

The road from Baltimore to Philadelphia, by way of Rahway, Havre de Grace, Newark, Delaware, Wilmington and Chester, was enough to drive one insane. I shall make no attempt to enumerate our difficulties, but, as an example, will give one. I shall not say just exactly where this occurred, but we had come out of a little town and were trying to climb a steep grade when we suddenly stopped moving, while our wheels skidded around rapidly. We did climb out of the car to ascertain the trouble. What would you do to a man who repaired a road by filling up the ruts with sawdust? Here was a stretch of 50 feet of road on an ascending hill, filled in with sawdust. Of course we could not move. We had to get out and pull down the neighboring fences for boards, and dig tracks for the wheels to run in so that we could climb over this bad stretch. I told a man in charge of a garage in Washington about this, and he seemed surprised that we had not met this difficulty oftener. Besides, this run from Baltimore to Philadelphia was 100 miles. No wonder that we did not reach the "Quaker City" until pretty nearly midnight.

From Philadelphia to Atlantic City was our next day's run, and was indeed a happy change from the preceding day's mishaps, the level roads of macadam and dirt

permitting us to make fairly good time through Camden, Kirkwood, Berlin, Egg Harbor City and Absecon. The temptation was great on this road to "hit it up a bit," as Smith had advised, and we really may have exceeded the legal city limits. We stopped for luncheon at a small town and had an adventure.

After we had eaten, Frank, who was tinkering with the car, which was standing in the road, noticed a man writing something in a note book after looking at the automobile registration number. Then he went down the road in the direction we were going to take, and stood with apparent nonchalance watching nothing. When we got into the tonneau Frank said: "That fellow down there is a constable. I saw his badge under his coat. He has a stop watch in his hand and is going to time us. See if I'm not right."

Frank opened up wide and we flew for a hundred yards or so; then he brought the car to a snail's pace. As soon as the car started the man down the road glued his eyes on something held in his hand—no doubt a stop watch. Minutes went by while we moved slowly ahead, and the man stared at the thing in his hand. When the latter finally looked up he saw to his evident disgust that we had only just reached him. Then Frank resumed his speed and turning around, as we passed the constable, waved him a cheerful adieu, and we laughed. We laughed loud and long. The constable didn't.

After a night at Lakewood we started early for our last day's journey—to New York. Everybody knows that route—to Asbury Park, then through Freehold, Old Bridge, New Brunswick, Metuchen, Perth Amboy, over Staten Island, and via the Staten Island Ferry to New York. The roads are good and nearly level all the way.

A humorous little incident which occurred along the way should, perhaps, be recorded. Frank, after starting the engine at Asbury Park, forgot to take the crank with him when he got into the car. Somewhere along the road the crank dropped into the dirt. We halted for a little refreshment at an inn near Freehold, stopping the engine. When we wanted to start again there was no crank, and Frank remembered where he left it and surmised how it was lost. We finally started the engine by bribing some bystanders, who were apparently quite ready to make an easy quarter, to push the car down a grade for a few feet. The wheels revolved fairly rapidly, Frank threw the clutch in and—wonderful to relate—the explosions began. I have seen this trick done since, but it doesn't always work.

It was dark night when we drove off the ferryboat deck onto little old Manhattan Island, and the long tour was ended.

Our trip had taken thirty-nine days, including five Sundays, when we did not travel. In making the tour again, I should

not try to keep under way so steadily. We had covered slightly more than 2,500 miles—or an average of nearly 75 miles a day. Our car had behaved well, and its occupants as well as could be expected. Of the pleasures of the trip in detail I may not speak, for space will not permit—except to say that the scenery we saw, the pictures we took, the jolly life we led, the free, clear air we breathed—all these had a remarkable effect for good upon us. Each of us had gained in health and strength; all of us in knowledge and experience, and in the faith which is inherent in every man that the out of door life, with all its joys, is "real living."

We had taken the bitter with the sweet. There had been accidents and rain and mosquitoes and constables; there had been poor board, annoyances and disagreeable humans to count with. But there had also been the mountain and the sea air, the sight of flowers and green trees, the sound of bees and birds and katydids and, in short, that rubbing against Nature in all her moods which is in itself a liberal education.

New Brazilian Rubber Tax.

United States Consul Kennedey, Para, Brazil, sends a report to the Government relating to a law passed by the Legislature of the State of Amazonas, which has created consternation among the rubber buyers throughout the Amazon Valley. Although this new legislation has been in operation for a short time, its true effect is not yet felt and may not be for some time, but exporters are already indulging in gloomy forebodings.

The first paragraph of the law reads as follows:

"To the Banco Amazonas, an institution of credit, which citizen Charles Figueiredo proposes to establish in this State, its place of business being in Manaus, is granted a right to levy a tax of 100 reis (2.5 cents) per kilogram on all rubber of every quality and 80 reis (2 cents) per kilogram on all cauchó placed upon the market and belonging to the State, said right to be established by special law."

Frank Da Costa, the largest exporter to the United States in Para, with an important branch house at Manaus, says:

"This law is sure to work harm to the general rubber trade, but it is yet too soon to say how serious its effect may be. This bank will have 100 reis (2.5 cents) per kilogram advantage over every other buyer in Manaus, and this means practically a corner on the rubber market at that point and an extra annual cost of at least \$400,000, provided the enterprise is well managed. This law is certainly a menace to the whole trade in Northern Brazil. However, we can only wait and let matters develop themselves. I have seen other obnoxious and dangerous laws repealed. It may happen again."

Fleetings of the American Society of Mechanical Engineers.

During the coming December meeting of the society the headquarters will be as usual at the society house, 12 West Thirty-first street, New York city, where the opening session will occur on Tuesday evening, December 1, at 9 p. m. The president, James M. Dodge, will deliver the annual address, the subject being "The Value of an Engineering Education to a Young Man."

The second session will occur on Wednesday morning at the hall of the Mendelssohn Glee Club, 113 West Fortieth street, because of the limited seating capacity of the society's auditorium. This will be the business session of the convention, and professional papers will also be presented. Following this, luncheon will be served at the society house, and the afternoon will be spent in making excursions to various power stations and points of interest. The evening of this day has been left free for the members to make their own engagements.

The third session will take place at the Carnegie Laboratory of Stevens Institute on Thursday morning at 10 o'clock. Luncheon will be served at the institute, and will be followed by visits to various points of interest in and about the grounds.

The usual reception for guests and friends will be at Sherry's on Thursday evening at 9 o'clock, and will be followed by dancing and supper. The closing session will be at the society house on Friday morning, December 4, at 10 o'clock.

Boycott Against German Oil Trust.

According to a United States consular report the petroleum dealers of Holzminden, Germany, have published a declaration in the official district paper, according to which they have pledged their word of honor not to buy any more from the German-American Petroleum Company, as it aspires to become a monopoly. In the discussions it has been mentioned that the Government of Brunswick does not consider that the arrangements made by the German-American Company for the retailers are in conformity with the provisions of the law, and that therefore the official order for their removal will be issued very shortly.

The following figures give the export of rubber from Brazil during the business year which ended June 30, 1903, according to United States Consul Kennedey, Para, Brazil: A total of 33,643,312 pounds was shipped to Europe and 32,111,799 pounds to the United States. The figures for Para alone are 13,422,609 pounds to Europe and 13,686,142 pounds to the United States.

NEW VEHICLES AND PARTS.

The 1904 Winton Touring Car.

The Winton Motor Carriage Company, Cleveland, Ohio, have issued a booklet of advance information regarding improvements in their 1904 model for their branch managers and agents. From this booklet we abstract the following:

The general system remains the same, but improvements have been made in many parts of the power mechanism, as well as in the running gear and equipment. The improvements in the engine consist of a heavier crank shaft of drop forged, high carbon steel; heavier connecting rods and studs and stud bolts. The fly-wheel is securely keyed to the crank shaft by hydraulic pressure. A new and improved contact breaker is fitted, insuring longer life to the batteries. The transmission system remains the same in principle, but improvements have been made in the friction clutches, which, instead of being of the disk type, are made with conical friction members. The male clutch member is made of case hardened steel and the female member of bronze, which reduces friction and wear to a minimum and also avoids the necessity of frequent adjustment. The set screws which secure the clutch adjustment are now made one-half inch in diameter, and cannot be broken off with an adjusting wrench or work loose and drop into the gears. The transmission gear case cover is secured in place more tightly, to prevent leakage of oil from the case. The driving chain is made heavier than in last year's model, and is automatically lubricated in the following manner: Heretofore the escape of oil through the air line valve under the driver's seat has been allowed to spray down upon the transmission gear case and muss things up generally. Now it is carried by a short brass tube from the escape valve to a point directly over the chain at the engine sprocket. Whenever the engine is running there is, therefore, a constant oil spray upon the chain, under a considerable air pressure.

The lubrication system for the motor bearings, pistons, crank pins, air pumps, &c., has also been improved. The float regulated gravity feed has been dispensed with, and an automatic force lubricator is now used, which insures an abundance of lubrication and reduces the waste of oil. Two quarts of oil will last for 500 miles travel with the new system. The oil is circulated by a positively operating pump, and is used over and over until its lubricating properties are exhausted, then the pet cock at the bottom of the reservoir is opened and the oil allowed to drain off. The pet cock is then closed, and the valve on top of the supply tank under the bonnet lid is opened and fresh oil fed down to refill the empty reservoir. The supply tank

has a capacity for upward of 2,000 miles of travel. Improvement has also been made in the lubrication of the roller bearings in the rear axle.

Both the front and rear axles are made of a better material—high carbon steel—than last year, and the front axle particularly has been greatly strengthened. The rear springs are 8 inches longer than those used in last year's model, and also wider, and have seven instead of six leaves, this change greatly improving the riding qualities of the car. Rubber bumpers are attached to the rear springs between the car frame and the spring seat upon the axle. In last year's model the wheels were 32 inches in diameter, and shod with 4 inch tires, but in the new model 34x4½ inch tires will be used, in accordance with the recent recommendations of the tire manufacturers. The engine sprocket has eleven instead of ten teeth, which, together with the increase in wheel diameter, will considerably increase the speed of the car.

The general lines of the body remain the same, but the tonneau is 4 inches wider and the door has an additional width of 3 inches. The third seat in the tonneau is attached to the door and is lifted as the door opens, and lowered into position when it is closed. When this seat is in position the tonneau door is automatically locked. The finishing color of the body will be changed sufficiently so as to permit of easily distinguishing the new model from any of the preceding ones.

The mudguards are of the sweeping pattern, as in last year's model, but are 2 inches larger all around. The equipment will include a detachable canopy top with side curtain attachments, a pair of gas headlights and a pair of side oil lamps.

Rambler Models for 1904.

During the coming season Thomas B. Jeffery & Co., Kenosha, Wis., will make a deviation from their previous practice of building only a single type of machine. Partly owing to the action of the Licensed Association in requiring agents to sign a contract to handle licensed machines only, Messrs. Jeffery & Co. are now bringing

out a comprehensive line of cars, ranging from medium weight runabouts to full weight, full powered touring cars, thus enabling their agents to be independent of other gasoline carriage manufacturers.

The touring cars will be equipped with a tonneau body, with a square bonnet in front, and honeycomb radiator of special design. The bonnet will be of pressed metal with polished brass side wings and edges. The dashboard will be vertical, and in the two cylinder cars will carry the spark coils in plain view of the operator. Improvements have been made in the carburetor and muffler, and the latter is claimed to perfectly silence the noise of the engine exhaust, with no more back pressure than to cause a speed reduction of seventeen revolutions in a thousand.

All the larger cars will have wheel steering and two independent sets of brakes, one set, of the internal expansion type, acting directly on the rear hubs. All rear axle bearings will be adjustable, and the differential casing absolutely oil and dust proof.

The Rambler output will comprise eight different models, ranging in price from \$650 to \$1,250. Four of these are single seat models, three double seat machines or touring cars, and one a light delivery wagon. The single seat cars have a single cylinder, engine 5x6 inches, and a wheel base of 76 inches. The touring car will have a double opposed cylinder engine, also 5x6 inches, and rated at 14 brake horse power. The wheel base of the touring car is 84 inches.

The Automobile on the Farm.

Of late years the bicycle has ceased to be a fad, and is kept for profit in its use, says *The Farmer*. The automobile will no doubt follow the same course, and will be employed largely in doing the work of the draught horse in the cities. When it is perfected and the cost is decreased it will no doubt take the place to a great extent of the driving horse.

Will it ever take the place of the horse on the farm? Not generally, but it is quite probable that in certain sections and on



AUTOMOBILE USED FOR SAWING WOOD.



MR. AND MRS. RIKER PASSING THROUGH THE CATSKILLS ON THEIR RETURN FROM PITTSBURG.

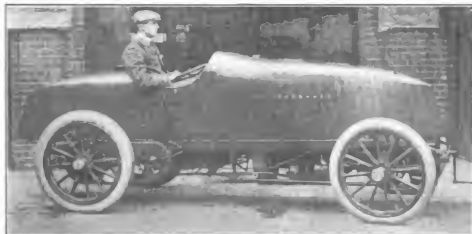
certain farms it will be used to advantage. Our English friends, who are not usually very ready to adopt new things, have been experimenting with the motor, as they call it, in farm work. We notice the results of several recent trials: Six acres of hay were cut in 3 hours and 20 minutes at a cost, including gasoline, oil and the time of the driver, of 42 cents per acre. Nineteen acres of wheat were cut in 10 hours, with the consumption of 18½ gallons of gasoline, or petrol, as it is called there. Two acres and fifteen perches of land were plowed to a depth of 7 inches in 5 hours and 49 minutes at a cost of about \$1.85 per acre. The acres there, it must be remembered, are larger than ours.

Of course, one does not expect a pleasure car, as now made, hitched to a plow, a cultivator or a reaper, but the present day automobile can be used advantageously

on many farms—aside from its regular use as a pleasure or business vehicle—for such purposes as water pumping, corn shelling, wood sawing, etc. An example of the last mentioned application is illustrated herewith. The motor of a Ford gasoline car is connected by belt to a power wood saw, evidently for cutting up the fuel supply of a country schoolhouse seen in the background. An extension is coupled to the engine shaft of the car and supported in an outer bearing secured on top of a post. To this extension shaft the driving pulley is fastened.

Rolls' Kilometre Record Car.

We reproduce herewith a photo of the 110 horse power Mors car with which Hon. C. S. Rolls broke the world's kilometre record in the Duke of Port-



HON. CHARLES S. ROLLS HOLDING WORLD'S KILOMETRE RECORD ON HIS 110 HORSE POWER MORS.

land's park, Welbeck, England, on October 12 last. The time in which the kilometre was run is 262.5 seconds, which leads all previous records for this distance. It is a question, however, whether this record will be confirmed by the clubs, as the course is slightly down hill and the record made on it previously by Mr. Rolls was not recognized. The car was timed by Harry J. Swindley and D. Straight, official timekeepers of the A. C. G. B. I. The previous best record was 263.5 seconds, made by Baron de Forest at Phoenix Park, Dublin, in July last.

Return Run Over Endurance Route.

A. L. Riker, who shortly after the completion of the Endurance Contest at Pittsburg started from that city for a run back over the same route to New York, arrived in the latter city on Thursday, October 23, after an actual running time of six and one-half days. Great road difficulties were encountered again in passing through the Catskill Mountains. At times the temperature was below the freezing point, and the car passed through a snowstorm, the photo reproduced herewith, taken shortly after the beginning of the snowstorm, showing the ground to be snow covered. The frozen mud made the road very heavy, and in some instances the second gear had to be used in running down hill, so hard was the pulling. The snowstorm was also responsible for the party losing their road and making a considerable detour. Among the troubles experienced during the return run were three tire bursts and a broken spring. The occupants of the car were Mr. and Mrs. Riker, M. O'Donnell and J. A. Kingman.

Boston Y. M. C. A.'s School for Automobileists.

The courses of lectures which the Evening Institute of the Boston Young Men's Christian Association has organized is meeting with unexpected success. Two hundred and sixty-five applications had been received a few days ago. There will be three courses in all as follows:

Course A—A series of lectures, fully illustrated, for owners, prospective purchasers, chauffeurs, machinists and others interested in motor traction.

Course B—A drafting course for mechanical draftsmen and machinists who wish to enter the automobile industry.

Course C—A practical laboratory or shop course, for owners, chauffeurs and machinists, in the mechanism, adjustment, handling and care of steam, gasoline and electric automobile motors, and stationary and marine gasoline engines.

Lectures on steam vehicles will be given November 10, 17, 24; December 1, 8, 15. Lectures on gasoline vehicles, January 5, 12, 19, 26; February 2, 9. Lectures on electric vehicles, February 16, 23; March 1, 8.

The Brighton Beach Races.

The last of the series of fall races under the sanction of the American Automobile Association was held on "the race track by the sea" at Brighton Beach, L. I., last Saturday, October 31, under the auspices of the Long Island Automobile Club. The weather was ideal, the day being sunshiny and quite warm for so late in the season. The attendance was not large and the grand stand was occupied only by a small crowd; but it was noticed that most of those who came in automobiles retained their seats in the cars, probably thinking it more comfortable there than on the grand stand, and the number of cars on the lawn was quite considerable.

While the programme gave the start of the races as at 1 p. m., it was somewhat later that the events actually began, the spectators being somewhat tardy in arriving. On the whole, the meet was well managed, everything passing off smoothly and the different events following each other with great regularity, a pleasing contrast to most former ventures of the Long Island Automobile Club. If it was not for the deplorable accident late in the day, in which one man received injuries which will probably make him a cripple for life, the meet would have been a most satisfactory one all around. No records were broken, although some very fast cars were present, and it has become quite evident that the Brighton Beach track is not a fast one for automobiles.

The first event of the day was a 5 mile race for stock cars of any motive power weighing under 1,200 pounds, for two silver trophies valued at \$100 and \$50 respectively. There were four starters: Lloyd O. Gitchell, 16 horse power Darracq; Joseph Tracy, 16 horse power Richard; O. A. Reed, 8 horse power De Dion, and F. A. La Roche, 12 horse power Darracq. Tracy gained a lead at the start and constantly increased it, lapping all three of his competitors—La Roche (secured second place) in the last mile. The De Dion did not work well and withdrew. Tracy's time was 6:41 1-5; La Roche's, 8:28 4-5.

In "the Seaside Scurry," 10 miles, for

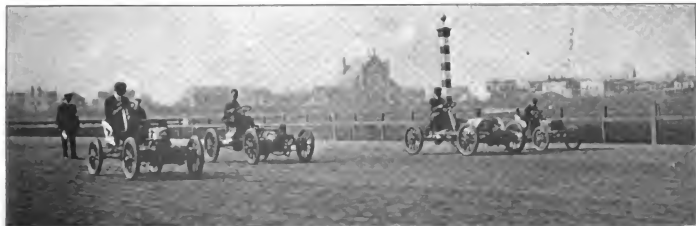


VISITORS' CARS ON LAWN.

cars of any motive power under 1,800 pounds (\$100 and \$50 silver trophies), there were three starters: The Packard Gray Wolf, a 30 horse power Renault, driven by M. G. Bernin, and a 40 horse power Darracq, driven by F. A. La Roche. The Gray Wolf was scheduled to be driven by Harry Cunningham, but it was announced from the judges' stand that Albert Champion, "the world's greatest motor cyclist," would pilot it. Champion had the pole at the start, Bernin coming next and La Roche third. Bernin got away much the fastest and made for the pole at the turn, retaining the lead till near the end of the third mile, with La Roche second. Then the latter took the lead and maintained it to the sixth mile, when he was passed again by Bernin, who then kept in the lead till the finish, winning in 11:23 2-5. La Roche finished second, in 11:35 1-5, and Champion third, in 12:13 4-5. It appeared that Bernin and La Roche were very closely matched, and the repeated repass-

ing aroused considerable interest among the attendance. It was Bernin's first experience on the race track, and he showed himself a daring and skillful driver, quite worthy to defend the racing reputation of the make of car he piloted. The car was owned by W. G. Brokaw.

Next the first heat of "the Rivals," a 5 mile race for gentlemen operators, was run off. In this event cars of the same make and approximate horse power were grouped, and all driven by their owners. In the final heat the winners in the different previous heats ran and were handicapped upon the basis of their running performance. Prizes: Two trophies of \$100 and \$50 value respectively. The starters were the 30 horse power Renault, belonging to W. G. Brokaw; the 40 horse power Darracq, of La Roche, and a 10 horse power Howard steam racer, driven by John W. Howard. Howard dropped behind shortly after the start and withdrew in his second mile. The race was at first



LINING UP FOR START IN FIRST EVENT.



GEO. C. CANNON'S NEW STEAM RACER

very close between the Darracq and the Renault, but toward the end the Renault established a fair lead and finished first, in 5:38 1-5, with the Darracq second, in 5:49 2-5. However, the Renault was driven by Bernin, instead of by the owner, as required by the rules, and it was therefore disqualified, leaving La Roche the winner.

In the second heat there were only two starters—Chas. A. Carlson, in a 15 horse power Winton, and E. B. Gallaher, in a 16 horse power Richard. To all appearances the stripped Winton touring car was no match for the sleek Richard racer, and Gallaher drew away from Carlson rapidly at the start, but later, evidently not wishing to dishearten his rival, kept his lead inside 100 feet to the finish. Time, 8:46 2-5. Carlson's time, 8:48 3-5. Gallaher was later disqualified because his machine was in racing trim, having no bonnet on.

The next event to be run off was that for the "Manufacturers' Challenge Cup," donated by the Diamond Rubber Company—a 5 mile race, open only to members of the A. M. L. Three cars started—the Howard steamer (at the pole), the Packard Gray Wolf, driven by Harry Cunningham (second), and the 40 horse power Darracq,

driven by La Roche. Howard took the lead at the start, but was soon passed by La Roche, and a little later also by Cunningham. His steam pressure seemed not to hold up, and he went slower and slower and dropped out in the third mile. La Roche, who was noticed to keep fairly to the outside of the track, both in the stretch and at the turns, maintained the lead, but Cunningham kept closely at his heels, as will be seen from the times made. Cunningham drove at the turns à la Barney Oldfield. La Roche won in 6:3 4-5, and Cunningham made a time of 6:7 3-5.

The third heat of event No. 3 was a walkover for Victor Kranich, 20 horse power Darracq, who ran one mile in 1:27 2-5.

In the fourth heat all the entries, four Franklin stock cars, started. The drivers were R. C. Seymour, R. M. Owen, J. G. Stewart and C. A. Hayden. None of these drivers had thought it necessary to disconnect the muffler and the "sewing machine" whirr of the four cars was in marked contrast to the deafening noise quite generally emitted by the mufflerless racers when lining up for the start, which not infrequently interfered with the announcements from

the judges' stand, especially as the announcer in addressing the reporters did not make use of a megaphone. Hayden drew ahead at the start and kept on gaining to the end, finishing with a lead of about a half mile. The other three remained close together during the first three miles, when Seymour gained a slight lead over Stewart, and the latter a similar lead over Owen. Hayden won in 9:1 2-5. Seymour's time was 9:47 1-5 and Stewart's 10 1-5. As attention has recently been called to the fact that the speed of air cooled machines on the track is likely to decrease as the motor heats up, it may be of interest to give the time for each succeeding mile for the winner. These times are as follows: First mile, 1:52 4-5; second mile, 1:44 4-5; third mile, 1:45; fourth mile, 1:45 3-5; fifth mile, 1:53 1-5. It will be noted that the time for the first mile is considerably greater than that for the immediately succeeding mile, as is usual. The time for the last mile is also considerably greater than that of the immediately preceding ones, but it is not absolutely certain whether the increased temperature of the motor was the cause, as drivers will sometimes slightly relax their speed toward the end if they have a safe lead.

The next event was the 15 mile race, free for all cars of any weight and motive power, for \$100 and \$50 silver trophies. Three of the five entries started—the Packard Gray Wolf (Cunningham), the 30 horse power Renault (Bernin), and 40 horse power Darracq. The Renault made a fine start and took the lead at once and ran finely throughout the race—better than earlier in the day. The Darracq (driven not by La Roche as scheduled but by a substitute) followed the Renault, and Cunningham, in the Gray Wolf, followed in the wake of the Darracq. At 5 miles the Renault led the Darracq by one-quarter mile and the Gray Wolf by one-half mile. At the end of the seventh mile it had increased its lead over the Darracq to one-half mile, and lapped Cunningham just before the end of the eighth mile. Toward the end of



EVENT NO. 3—FOURTH HEAT.

the race the Darracq also lapped Cunningham, who retired at the end of his thirteenth mile, from one of the rear wheels of his car as he passed the grand stand, something being evidently wrong with that wheel or the brake. The Renault won, in 16:18 1-5. The best miles were the fifth and sixth, which were both done in 1:2 1-5. The time of the Darracq was 17:30.

Next a special 3 mile match race for steam cars (for silver trophy) was run off between George C. Cannon, with his new 6 horse power racer, and John W. Howard, with his 10 horse power racer. Cannon's new machine is very long and low, with seats for the operator and steersman in front, a huge fire tube boiler midway between axles and a horizontal marine type (Mason) engine back of the boiler and directly geared by spur gears to the rear

scrutch; the 20 horse power Darracq, driven by Victor Kranich, with 56 seconds handicap, and the Franklin, driven by C. A. Hayden, with 3 minutes 20 seconds handicap. Carlson's Winton was accorded a handicap of 3 minutes 8 seconds, but for some reason did not start. The handicaps, as stated, were figured on the basis of performance in the previous heats, and it was therefore to be expected that the finish would be close, provided the cars ran regularly. Such proved to be the case. At the end of the fourth mile La Roche seemed to have little chance of winning from the Franklin, which at that time was in the lead and seemed to have the best chance. At the top of the back stretch he still was about three-sixteenths mile behind, but was going at about twice the speed of the smaller car, and it then became evident that the finish was doubtful and would be

for the scene of accident ensued. Crowds rushed onto the track all along the line in front of the grand stand, clubhouse lawn and stables, in some instances exhibiting remarkable skill at fence vaulting, and ran across the track and down the infield toward the three-quarter mile post as fast as their feet would carry them. At this time two of the fastest flyers of the day were still circling around the track in hot pursuit of one another, and one could not suppress an apprehension of danger if the track should not be cleared by the time they came around to the grand stand. Two of the mounted police then charged down the stretch in a furious gallop, turning neither right nor left, and apparently intending to scare those who might feel tempted to cross the track. Excitement meanwhile reigned at the grand stand, a number of women giving suppressed



THE THIRTY HORSE POWER RENAULT.
GRAY WOLF SKIDDING AROUND CURVE.



THE GRAY WOLF AFTER THE ACCIDENT, SHOWING FENCE POST TORN AWAY
AND FRONT OF MACHINE DAMAGED.

axle, with driving and driven gear of the same diameter. The boiler is fired with a Barber kerosene burner. Two men are required to operate the machine, one operating the steering handlebar and the other the power controlling devices. Geo. C. Cannon operated the power controlling devices and Joseph Tracy steered. Howard occupied his car alone, which is best described as a large model steam runabout, with wheel base somewhat lengthened. Cannon started next the pole and slowly but steadily drew away from Howard. At the end of the second mile the latter seemed to be out of steam, and Cannon increased his lead more rapidly and won by a half mile in 3:46 3-5. The times for the separate miles were 1:20, 2:33 and 3:46 3-5.

After this event came the final heat in event No. 3. The 40 horse power Darracq, driven by La Roche, started at

very close. The spectators in the grand stand rose to their feet and cheered vociferously as La Roche evened up with Hayden about 25 yards ahead of the finish and crossed the line a little over a car length ahead. Time, 6:3 2-5.

The event to be run off next was an unlimited pursuit race, free for all (Class A), for a \$100 silver trophy. The starters were the 30 horse power Renault (at the tape), 40 horse power Darracq (at one-quarter mile post) and the Packard Gray Wolf (at five-eighths mile post). The starter climbed to the roof of the judge's stand and by simultaneously shooting his pistol and waving his flag effected a satisfactory start. The eyes of the grand stand occupants naturally turned from one machine to another, and suddenly someone shouted that the Gray Wolf had crashed through the fence. It could be seen in the infield near the three-quarter mile post at rest. A rush

shrieks. A hundred field glasses, more or less, were directed at the scene of accident, but as it was over a quarter mile away and was surrounded in a moment's time by spectators, who had occupied places along the outside fence at that point, little of importance could be seen. Presently someone among the attendance, realizing the need for a palliative to soothe the nerves, particularly of the women in the grand stand, started the report that the driver was not hurt badly, he having seen him rise to his feet. This had a quieting effect until three revolver shots rang out at the scene of disaster, intended as a signal for aid. A considerable number of cars at once started from the stable, the clerk of the course being already on the spot. There was considerable agitation also on the judges' stand, and an evident desire to allay any undue excitement reigning in the grand stand, for before any reliable report

could have come from the scene of accident the announcer informed the grand stand that "Harry Cunningham is not badly injured." It was known to some occupants of the grand stand, however, that not Cunningham (who was mentioned in the programme) but Albert Champion had been driving the Gray Wolf in this event, and this showed that the information offered could not be credited with much reliability.

Cunningham had refused to drive in the race, apprehending disaster, owing to the condition of the track, and particularly the sharp turns, which caused the car to skid badly. Champion, who had piloted the car earlier in the day, offered to take his place. Starting at the five-eighths mile post he had made one complete turn of the track and was turning into the home stretch when his car skidded very badly, the rear end slewing around and the wheels describing a wide swath in the sand, which turned the

bent the lower portion of the wheel inwardly.

Bernin caught La Roche in 1 3/4 miles; no time was given.

The next race was a 5 mile club championship race, and saw three starters at the tape—Chas. J. Carlson and J. M. Mack, both in stripped Winton touring cars of 15 horse power, and C. H. Tangeman in a 16 horse power Fiat tonneau. Tangeman took the lead at the start, but was passed by Carlson at 1 1/2 miles, who kept the lead to the finish, winning in 8:14 3/5. The Fiat, with its high back seats, looked anything but a racing vehicle or in racing trim.

The last race of the day was the 10 mile Brighton handicap, in which the following started: Thirty horse power Renault (M. G. Bernin), scratch; 40 horse power Darracq (F. A. La Roche), 5 seconds handicap; 16 horse power Richard (Joseph Tracey); 6 1/2 horse power Cadillac (I. D. Plank), 5 minutes to seconds handicap; 15

COMMUNICATIONS.

The Franklins in the Endurance Run.

SYRACUSE, N. Y., October 31.

EDITOR HORSELESS AGE:

In the last issue of *THE HORSELESS AGE* we notice an article headed "Air Cooled Machines in the Endurance Contest," which in reality says nothing about the air cooled cars in the Endurance Contest, but draws several conclusions about air cooled cars in general, some of which are incorrect.

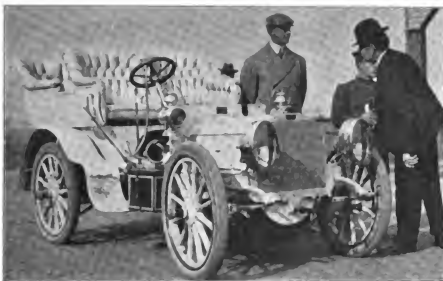
The writer would like to call attention to these mistakes and also to give you a brief description of the air cooled machines in the Endurance Contest from the point of view of an operator.

Mr. Perrin makes the statement that no air cooled motor will stand the test of continual low gear running without marked loss of power, if not actual sticking of the pistons. The first is undoubtedly true to a large extent, but it is an impossibility to stick the pistons in an air cooled car while running on the low gear as long as the oil feed is working normally.

He also draws a conclusion of the falling off of power from a 10 mile race held at Yonkers, in which the car was a minute slower on the last 5 miles than it was on the first 5 miles, but neglects to notice that the last mile was run faster than any one of the preceding miles, and that the operator had never driven the car before, while in the first trial of this car it was driven by the writer, who was, of course, perfectly familiar with the same.

In regard to the Endurance Run—in the first place the official record should show that Franklin cars Nos. 26 and 27 were not late at any of the controls through any fault of their own. Franklin car No. 26 was stalled on Belden Hill, 22 miles from Binghamton, at 6:30 o'clock on the evening of that memorable second day's run, from lack of cylinder oil which the operator had been unable to obtain along the road. He was compelled to return to Harpersville and take the train to Binghamton, which he reached at 3 o'clock in the morning. Here he obtained a supply of oil, but owing to a washout on the railroad between Harpersville and Binghamton was compelled to get a team and drive back. You could hardly charge this up to the fault of the car. They were unable to get to the car and resume their journey again until 4 o'clock the next afternoon, when conditions had become something frightful.

Car No. 27, which the writer took charge of at Delhi, had been delayed seven hours of the second day owing to sickness of the operator, who on one occasion had to be put to bed in a farmhouse. For this reason this car was unable to leave Delhi un-



THE SIXTEEN HORSE POWER FIAT TONNEAU.

front end into the fence. The car broke away the lower rail of the fence and Champion ducked his head and passed unscathed beneath the upper rail, but the front axle had broken off close to the right hand wheel, and after the car had passed through the fence the front end dug into the ground, which brought it to a sudden stop and projected Champion a distance of at least 20 feet. He sustained a compound fracture of the right leg and bruises on the head, and was taken to the Kings County Hospital. The point where the machine crashed through the fence was about 10 feet ahead of the three-quarter mile post. It is not definitely known, whether the front axle was broken by the side pressure on the front wheel when the rear slewed around or by contact with the rail, but it is quite certain that abnormal skidding was the cause of the accident. One of our illustrations herewith shows the side skidding of the front wheel at the turn where the accident occurred, and how it

horse power Winton (Chas. Carlson), 5 minutes 16 seconds handicap; 30 horse power Daimler (John J. McMulkin). It was getting darker by this time and somewhat difficult to follow the machines around the track. The race was won by C. A. Carlson (15 horse power Winton) in 15:25. F. A. La Roche was second and Plank (Cadillac) third. Plank, not knowing that the race had been won by Carlson, continued around the track several times, and for some reason overturned his machine.

The officials of the meet were: Racing committee, A. R. Pardington, Edwin Melvin and H. P. Hanaford; referee, Samuel A. Miles; judges, S. M. Butler, L. R. Adams and Lawrence Abraham; timers, Charles J. Dreges, Robert Stoll and S. D. See; umpire, Frank Eveland; club handicapper, Herbert L. Towle; starter, A. J. Pickard; assistant starter, P. J. Fisher; clerk of course, J. Frank Borland; assistant clerk of course, D. D. Martin; announcer, Peter Prunty.

til 11:30 on Friday morning. It was at that time raining harder than at any other stage of the run, and 8 miles out of Delhi we ran into water which covered the set screws on the lamps. Here we were towed through by an obliging farmer, and I wish to bear witness that all along the route every farmer seemed to be most willing to do anything and everything to help out the automobiles in distress.

Eight or nine miles farther on, near Franklin, we were urged to abandon the run owing to a washout, but pushed on and found it about the same as the previous flood. Another farmer towed us through here, but we were obliged to sit with the water almost over our motor and running in under the box over the spark coil for about forty-five minutes.

We arrived at Unadilla at 5:30, just behind the Columbia car, which had left Delhi at 8 o'clock. After delay for something to eat, we immediately left Unadilla and very soon caught up to the Haynes-Apperson surrey, plowing its way through the mud and darkness. A few miles before we got to Alton we were compelled to make a long detour to escape a washed out bridge, and on this road ran into some sand, with about 6 inches of water over it, which had become veritable quicksand. Owing to the lightness of our car we were able to push it to one side of the road and proceed, but learned later in the evening that one of the large tonneaus, a few hours previous, had sunk so deep into this quicksand that it required the efforts of two teams and a heavy block and tackle to get it out.

At Alton we put up for the night, in company with Mr. Dorris with the St. Louis and Mr. Fowler with the Knox. Next morning we all arose at 4 o'clock and started on our disagreeable journey as soon as possible. At Harpersville we saw the last of the Knox, and we were sorry to learn later that Mr. Fowler had been obliged to retire owing to burns received from a can of carbide catching fire. The writer had special sympathy with him, as he had had his own experience with fire a couple of days previous. We arrived without anything further unusual at Binghamton at 9:30. We immediately proceeded onward after grinding the exhaust valves in our engines, which gave more or less trouble all the way from here to Buffalo, probably on account of the oil pump being put out of business, compelling us to resort to hand pumping into the base to keep the motor supplied with lubricating oil.

A few miles out of Binghamton we ran through a long stretch of water, about 18 to 20 inches deep and one-quarter of a mile long, but were able to make Owego in very fair shape. At Owego we caught up with Franklin No. 27 and passed the St. Louis, laid up with tire trouble. A few miles out of Owego we noticed the return tracks of a large automobile, and their subsequent turning off at what looked like no more than a cow path. Upon inquiry we

found the road was impassable below that, there being no farmers that would volunteer to pull the automobile through what purported to be 6 feet of water, and that the large car had taken the cow path over the mountain in its effort to still push on. We took the same route and soon came up behind Mr. Cowan with the Knox, in a game struggle to surmount the hill, which in places must have measured as high as 35 per cent. grade. We lent him our assistance to help his car up the hill, and in turn were helped up by him. These three cars then proceeded practically together until we reached Elmira, about 9 o'clock in the evening. Here we had a good meal, our first in about eighteen hours, which put us in good spirits, and we decided to push on to Bath that night. The roads from Elmira to Bath cannot possibly be described.

While going out of the city of Elmira we jumped over the trolley tracks, put one side of our wagon into a newly filled up sewer, and were held up until we received assistance from the passengers and crew of a trolley car. It was one long, long grind on the low gear. At one place, had we not been together with our other car, we could not possibly have gotten through, as we were compelled to rip planks off an unfinished bridge and lay them at some length through a waste of mud and water. Even then it took the combined efforts of the engine and four men to get the cars through. We finally arrived at Bath at 5:30 in the morning, after a most exhausting run over the muddiest and worst roads of the entire trip.

Forty miles in eight hours was our record, and in truth it should stand as a record.

After a stop of about an hour in Bath, with the hope of getting something to eat, we were obliged to start on, as the hotel people refused to give us anything, so we took breakfast a little later down the road about 10 miles. Here we caught up with Mr. Nutt with the Haynes-Apperson run-about, and proceeded with him off and on all day until we got to Buffalo. Near Avon we caught up with two Oldsmobiles, and proceeded with them into Buffalo, arriving there at 9:30 in the evening.

From Bath to Avon, about 60 miles, it took us eleven hours, and from Avon to Buffalo, about the same distance, we were three and a quarter hours, the last being run in the dark. Such is the difference between a good hard road and the ordinary roads through New York State, than which there are none poorer.

Leaving out the very unfortunate occurrences which delayed the cars on the second day of the run, and to which no fault or penalty should fall on that account, we were very well satisfied with the run, having on the road from Delhi to Buffalo passed nine automobiles and caught up to three others, and would say further that not one of these nine automobiles which we passed on the road reached Buffalo within twenty-four hours.

Both Franklin cars were troubled on this strenuous run from exhaust valves becoming burned and pitted, but it was not necessary to stop on the road to fix them, as we were able to do it evenings after putting up for the night. However, we noticed that some water cooled motors had been held up for the same cause. How the planetary system of transmission ever stood this run we do not understand, although we had such in our own cars, and it was a very pleasant surprise that we were not held up on account of the same.

During this trying run, with the rain falling almost continuously, we never experienced one moment's trouble with the ignition.

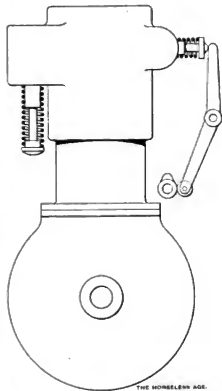
At Buffalo we were compelled to remove our chains and the rear sprocket on one of the machines, owing to five teeth having been knocked out on rocks during the run. The chains in each case had stretched about 5 inches.

H. H. FRANKLIN MFG. COMPANY,
John Wilkinson.

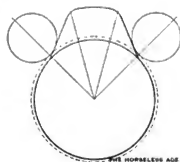
Explosion Engine Query.

Editor HORSELESS AGE:

For some time I have been thinking of making some changes on the inlet valves of a Pope-Robinson car. The inlet valves on this car are not by any means over large, and as in such cases the lift has to be considerable they do not recover very quickly. To operate these valves mechanically is fortunately going to be a very simple matter, as the stems project horizontally about 1 inch. As the stems are rather long and light to strike with a cam direct, I propose putting a finger on each



THE HORSELESS AGE.



one, so that the blow will be direct and not in any wise tend to bend the stem.

I would very much appreciate it if you would give me sketches showing at what part of stroke the valve should open to get the very best results, also the exact time it should close. Kindly also give sketch of cam. H. B. GREENING.

[We presume the clear diameter of the valve is about $1\frac{1}{4}$ inches. The lift should be one-fourth as much as the clear diameter, or about five-sixteenths of an inch. Supposing the arms of your double armed lever (shown in sketch) are of equal length, the raise on the cam should then be five-sixteenths of an inch high. The cam shown in sketch herewith is of approximately the form to give maximum power, and is the actual size. One-thirty-second of an inch clearance is allowed to insure proper seating of the valve and the "full open" arc is made 30° .

This cam, with a roller of the size shown, will hold the valve open for just the time of a complete piston stroke. The cams can be set so as to open and close the valves when the crank is in the dead centre or very slightly later.—Ed.]

Grades.

Editor HORSELESS AGE:

I cordially agree with R. W. B., in your current issue, on the grade question, the cause of my error being correctly stated by yourself.

It is next to impossible to estimate grades accurately, or even approximate them, when riding; for to one braced up against the back of a seat grades are only relative to that just past. Often on this run we thought we were on level, or nearly level, ground, when a glance at the gutter alongside would show the water running in regular cascades.

On Belden Hill, which we ascended after dark, the operator complained that the engine was not giving any power, as he could only use his low gear. We tried to convince him that we were climbing a pretty stiff grade, but none of us had any idea what it really was until we looked it up in the guide book and found it rated as "10 to 15 per cent. three-fourth mile long."

That exonerated the engine. From many similar experiences we gave up all idea of estimating grades from a moving vehicle, and accepted the guide book's

statement of 10 to 14 per cent. for the boulevard without question, but if I had been guessing at the time I would have said about 6 per cent.

A short grade appears much less than a long one. When afoot I usually estimate a grade by looking off as near level as possible, and then estimate, or pace, the distance to the intersection with my line of vision; if that is 100 feet the grade is a little less than 6 per cent.; 50 feet, approximately 11 per cent.; 33 feet, 17 per cent., etc. I can usually come within one or two per cent. HARRY E. DEY.

Hardships of the Endurance Run.

YOUNGSTOWN, Ohio, October 28.

Editor HORSELESS AGE:

I notice that automobile papers are giving Edward Collier, operator on No. 17, Rambler, credit for the longest run without sleep or rest, from Bath to Youngstown, $395\frac{1}{2}$ miles.

From the time the writer left Smithboro Bridge, $270\frac{1}{2}$ miles from New York, Monday morning, until he reached Pittsburgh, he did not stop for sleep or rest, making a continuous run of $526\frac{1}{2}$ miles, and four nights without sleep, instead of 120, as I notice some of the papers have stated.

F. L. THOMAS,
Operator, Fredonia, No. 20.

Best Route from Cleveland to Chicago.

CHICAGO, October 27, 1903.

Editor HORSELESS AGE:

I desire to thank you for the route from Cleveland to Chicago given in your letter of September 3 last. I had a very pleasant run from New York to Chicago in my motor car, although in many places the roads were very bad indeed. In going from Fremont to Napoleon we were unfortunately enough to run into a heavy three days' rain, and as this was through the oil region of Ohio, where there are only clay roads, we found it not only exceedingly heavy but very dangerous. Would certainly not advise anyone to go through that way except in dry weather. Otherwise, they will find it much better to go through Clyde on to Toledo, and from there to Wadsworth.

Not only at South Bend, but at La Porte, I was directed to Chicago by way of Valparaiso, and although the distance is longer that way, it keeps you away from the heavy sand which you would have to run through should you keep closer to the end of Lake Michigan. The roads from Valparaiso to Chicago are practically perfect via Wheeler, Hobart, Hammond and South Chicago, and aside from three or four miles of sand between La Porte and Valparaiso the road is good all the way, and until you find a shorter route of good roads from La

Porte to Chicago would suggest your turning future tourists from the route I came. J. H. WARE.

Horse Power of Gasoline Motors.

Editor HORSELESS AGE:

We would like to be informed through the columns of your esteemed paper how it is that the Autocar Company, of Ardmore, advertise a 4×4 double opposed motor as 11 horse power and the Ford Motor Company, of Detroit, advertise a motor of the same dimensions as 8 horse power. Can both be correct? If not, which is?

WILSON & CO.

[Both can be correct, as the horse power depends not only on the bore and stroke but also on the speed, degree of compression and other factors. There is no definite limit to the power a cylinder of certain dimensions will give.—Ed.]

Electric Touring.

CHICAGO, Ill., October 31.

Editor HORSELESS AGE:

I note with interest your editorial on electric touring in this week's issue of THE HORSELESS AGE, and in connection therewith it may be interesting for you to know that several electric enthusiasts have been regularly taking long trips in the vicinity of Chicago.

During the summer Mr. Clark, a user of a Woods stanhope, made a trip from Chicago to Milwaukee and return via Burlington, Wis., a distance of 120 miles each way, on four complete charges, a little over 60 miles on a charge. His machine has a maximum speed of 18 miles an hour, and he has frequently gone 80 miles on a charge over Chicago boulevards. With a full charge in Chicago and a loss of four hours for charging and refreshments on the road the trip of 120 miles should be made in twelve hours.

I know of several other trips taken in standard Woods stanhopes, to some resort over 50 miles distant, and in no case had the battery discharged itself so low that a loss of speed was noticeable.

FREDERICK J. NEWMAN.

Loss of Power Due to Muffler.

Editor HORSELESS AGE:

Can you inform me what is the gain in cutting out the muffler in gasoline engines? Say, for instance, a 3 horse power engine will gain about what excess of power when the muffler is cut out?

A.
[That depends entirely on the particular muffler, and may be either almost nothing or as much as 25 per cent. A trial will furnish the only reliable answer to your question, though the results may be relative only. Time the car over a certain distance first with muffler on and then with muffler off. The increase in speed will be a measure of the increase in power.—Ed.]

...OUR...
FOREIGN EXCHANGES



Italian Motor Bicycle Hill Test.

Northern Italy is unusually hilly and great hill climbing power is therefore an essential of motor vehicles for use in that territory. With a view to determining the hill climbing ability of motor bicycles, the Italian Touring Club organized a hill test for such machines a few months ago, the route extending from Susa to the hospital on the Mont Cenis—a total distance of 14.4 miles, with a total rise of 4,700 feet, or an average grade of 6.2 per cent. The total number of entries for the test was thirty-four. Of these twenty-seven started, fifteen reached the finish within the time limit, two reached the finish after the time limit had expired and ten did not finish. All the starters had motors of either 2 or 2½ horse power, and, with one exception, all the machines were built either in Milan or Turin.

An interesting study of the transmission arrangements of the competing machines is published by A. Rostain in the "Monthly Review of the Italian Touring Club," from which we take the following:

"The most common form of transmission consists of a twisted belt, which transmits motion directly from the motor to the driving wheel, running on pulleys fixed to the motor shaft and wheel rim respectively. This system is fairly satisfactory for low powered motor bicycles, of about one horse power, but becomes unsatisfactory when the motor is 1¾ to 2½ horse power, because the speed of the belt is limited, and consequently there is a very high tension on the belt, resulting in slipping and rapid stretching, especially when the machine is being used in hilly territory. The slipping results in loss of energy and sometimes in heating up the motor, and the rider then finds it necessary to dismount, take up his belt and allow the motor to cool off.

Most of the leading manufacturers have therefore abandoned this primitive system of transmission, the impracticability of which was well shown by the present hill test. Following is a table of the results of this test, classified according to the system of transmission employed:

	Starters.	Arrivals.
Twisted belt.....	6	1
Flat belt.....	9	5

	Starters.	Arrivals.
Trapezoidal belt.....	6	4
Chain and gears.....	4	3
Belt and chain or gears....	2	2

To reduce the vexatious slipping some manufacturers have substituted for twisted belts flat belts of a width varying from 1 inch to 1½ inches, thus increasing the friction surface between belt and pulley. This is certainly a step in advance, but does not eliminate all the disadvantages of the original system.

More reliable than the flat belt is a trapezoidal form of belt, first introduced by an English firm, shown in Fig. 1 herewith. The belt is made up of several layers of leather cemented together, and also secured together by metal rivets. The grip of the inclined walls of the belt on the sides of the pulley groove prevents slipping, but power is lost by forcing the belt down into the groove and pulling it out again. Aside from this, this form of transmission is quite reliable, as shown by the contest, four of the six starters in this class having reached the finish.

In order to avoid all loss of power by slipping, some manufacturers adopt a rigid system of transmission (by chain or by gears and chain.

See Fig. 2). This system insures a continuous and synchronous transmission from the motor shaft to the rear wheel. Its defect resides in the fact that all irregularities in the running of the motor are transmitted to the driving wheel. It is well known that the rotary speed of a single cylinder explosion engine is not uniform, but increases and decreases during every cycle. With a rigid transmission all variations in motor speed are transmitted to all parts of the machine, which greatly reduces the comfort of the rider. One of the machines with this kind of transmission was fitted with a compensating device in the rear hub to reduce the irregularities. This device, while it does not possess the same elasticity as the belt, certainly has some beneficial effect, but it also increases the weight of the machine and complicates the mechanism.

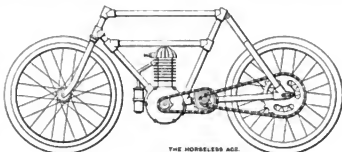


THE HORSELESS AGE.

FIG. 1.

Other disadvantages of the chain are its noisiness, its weight, its short life and the loss of power caused by grinding due to the impossibility of keeping the chain properly lubricated and free from the dust and mud of the road. The good qualities of this transmission system are well brought out by the results of the present contest, three of the four starters having arrived, and the failure of the fourth to arrive was due to no fault of the transmission.

Of the other two methods of transmission attention should particularly be called to that employed by the winner, as much on

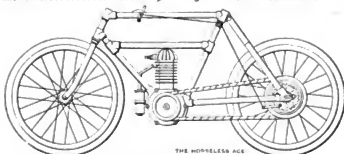


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FIG. 2.

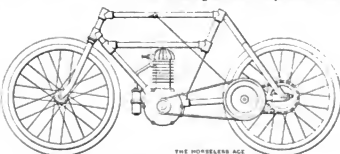
account of its originality as on account of the really remarkable results obtained. In this machine the frame and motor (2 horse power) present no special features. The novelty resides entirely in the transmission, and particularly in the reducing motion employed, which is disposed inside of the rear pulley. This reducing motion is mounted concentrically to the axis of the driving wheel, and is composed of a set of pinions and a toothed wheel, so calculated that four turns of the driving pulley result in only one turn of the driving wheel. The diameter of the driving pulley is about 13 inches and the reducing motion admits of giving the motor pulley a fairly large diameter (6 to 6½ inches). The driving belt has therefore a large contact surface on the pulleys, and its linear speed is relatively high (45 feet per second), which practically avoids all slipping and stretching.

The reducing motion comprises an inter-



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FIG. 3.



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FIG. 4.

nal friction clutch, which, by simple operation of a handle on the upper frame tube, permits of gradually engaging the motor and drive wheel. The provision of a friction clutch is very valuable for running on steep hills and in making sharp turns, throwing out the clutch in such cases being safer than simply interrupting the ignition. With the friction clutch the motor is allowed to run with ignition retarded, and when the turn has been passed it is speeded up and the friction clutch thrown in again.

In Fig. 4 is shown a system of transmission which in many points is similar to that just described. Interposed between the motor and drive wheel is a change gear, giving two forward changes of speed, the lower one-half that of the higher. The transmission from the motor to the change gear is by belt, and from the gear to the driving wheel by chain.

The winning machine was built by E. Amstutz, of Besançon, France. It had a 2 horse power motor, and a transmission by round belt and a planetary reducing motion on the rear axle. This machine covered the 14.4 miles, with an average grade of 6.2 per cent., in forty-nine minutes, or at an average speed of 17.6 miles per hour. Second place was secured by a 2½ horse power machine with flat belt transmission, built by Stucchi, Milan. Its time was 54m. 15s., and its average speed about 16 miles per hour.

New Panhard Cooling Arrangement.

The Mercedes practice of making the bonnet over the motor airtight and drawing air through the cellular cooler by means of a fan connected with the motor flywheel is being extensively imitated, the same as other earlier Mercedes features. In a recent issue we described an arrangement patented by the Renault firm, in which the air is drawn through a cooler located at the rear of the engine, by means of a fan secured to the flywheel, and herewith we show a sketch of an arrangement recently patented by Panhard & Levassor, which very closely resembles the Mercedes arrangement. In fact, the only difference is that the fan, instead of being of the screw propeller type with

its blades constituted by the spokes of the flywheel, is of the centrifugal type, and forces the air radially outward through openings in a casing over the flywheel. The advantages of having the bonnet closed, except for the radiator openings and the openings of the fan casing, are that the strongest cooling draught is obtained with the least expenditure of power and that the motor is kept exceptionally clean from dust and mud.

The alloy used for bearing purposes on the Pennsylvania Railroad is said to consist of lead and antimony in the proportions of 87 per cent. of the former and 13 per cent. of the latter.

The A. C. G. B. I. in its efforts to affiliate the provincial clubs is meeting with the same obstacles as did the A. C. A. nearly two years ago. Some of the smaller clubs refuse to become affiliated, and have started a campaign to organize a federation among provincial clubs.

A track race meet was held by the German A. C. on Sunday, October 18, on the West End mile track near Berlin. A heavy shower fell late in the afternoon and partly spoiled the event. In a 10 mile race for heavy racing cars a time of 12m. 23s. was made by a Mercedes car.

The official tour of the Dutch Automobile Club, September 21 to 24, was favored with perfect weather. The tourist cars comprised 1 Daimler, 3 Durkopp, 2 Cudels, 1 De Dion, 3 Spykers, 7 Darracqs, 3 Dechamps, 2 Clements, 8 Peugeots, 1 Oldsmobile, 1 Panhard, and 3 Delahayes.

A motor cycle reliability trial was held on October to between Belfast and Dublin, under the auspices of the Northern committee of the Motor Cycle Union of Ireland. The competition took the form of an interbranch contest between the Northern and Dublin branches of the union. The entries were not restricted, but the best three performers in each team counted, and the team making the best aggregate score won. The team result

was as follows: Belfast—Ireton, 0; Mallon, 3; Ireland, 5 (total marks lost, 8)—first. Dublin—Franklin, 0; Summers, 5; Evans and Murphy, 10 (total marks lost, 15)—second.

The English Napier Company will exhibit at the Paris Show a six cylinder 18 horse power car, seating five persons and weighing less than a ton.

Our French contemporary, *La Locomotion Automobile*, publishes a report that in 1904 four cylinder engines will be employed almost universally by American manufacturers. We can inform our contemporary that the report is radically wrong.

At a recent meeting of German rubber goods manufacturers in Hanover, a resolution was adopted to increase the price of articles manufactured from rubber 10 per cent., in view of the increase of from 50 to 90 per cent. in the price of raw materials.

Some young automobilists of both sexes have developed a habit of riding without headgear during warm weather, and this practice is recommended in recent newspaper correspondence, as fresh air and sunshine are the best herpicides and the best preventives of baldness.

The Frankfort Automobile Club, of Frankfort a. M., Germany, on October 11 last held an endurance contest from Frankfort to Feldberg and back, a total distance of 84 miles, in a very hilly territory. The affair seems to have been more or less of a race, as some of the competitors made the first 66 miles to the top of the Feldberg hill, a total rise of about 2,000 feet, at the average rate of nearly 30 miles per hour. One of the cars upon bursting a tire overturned into a ditch and seriously injured the occupants.

Trade Literature Received.

The National Sewing Machine Company, of Belvidere, Ill.—The Crandall Mechanical Lubricator.

Billings & Spencer, of Hartford, Conn.—Circular on front axle forgings and steering connections.

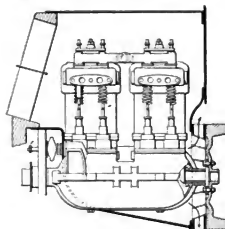
The Hussey Drop Forging and Manufacturing Company, Axelt street, Cleveland, Ohio.—"Lehman's Unrivaled Patented Universal Joint."

The Hussey Drop Forging and Manufacturing Company, Axelt street, Cleveland, Ohio.—Catalogue of auto parts and sundries.

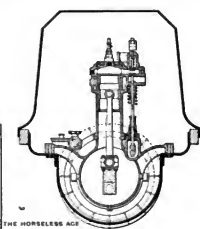
Evening Institute, Boston Young Men's Christian Association.—Program of a series of lectures on automobiles to be given during the coming winter.

Winton Motor Carriage Company, Cleveland, Ohio.—"1904 Winton."

Lobe Pump and Machinery Company, 140 to 152 Terrace, Buffalo, N. Y.—Folder describing the Lobe circulating pumps.



NEW PANHARD COOLING ARRANGEMENT.



THE HORSELESS AGE.

The Handicapping Formula.

Herbert L. Towle writes us as follows: Although the results of the Brighton Handicap last Saturday were not wholly satisfactory, they showed a sufficient advance over those of the Empire Handicap of October 3 to indicate the substantial correctness of the formula used in handicapping, and to warrant giving it to the public.

This formula is based on one devised by two French engineers, MM. Julien and Boramé.

The French formula was based only on speeds up to 40 kilometres per hour, and was designed for dry macadam roads. It is as follows:

$F = .025 W + .0007 W V + .0048 A V^2$, in which F equals driving force in kilograms, W equals weight of car and passengers, V equals velocity in kilometres per hour, and A equals projected front area in square metres. The coefficient .025 is for plain hub bearings.

The formula does not appear to have been put to practical use in the country of its origin, and in adapting it to track racing it was necessary to modify the coefficients somewhat, and also to devise a practical method of calculating F. As there appears to be no very easy way of separating the various factors for experimental determination, the coefficients used are still more or less subject to change. At present the following seems about right for straightaway tracks:

$F = .025 W + 3 W V + 30.000 A V^2$, in which F and W are in pounds, A in square feet, and V in fractions of a mile per second. For ball or roller hub bearings, .025 W becomes .01 W. For a heavy track or stiff tires, 3 W V may become 4 W V or more. A will vary from 4 to 8 for such machines as the writer has thus far examined.

For handicapping purposes it is only necessary to calculate F from known and assumed data, and to transform the formula so as to solve for the elapsed time per mile in seconds. On a circular track allowance must, of course, be made for the difference in time between such a track and a straightaway.

To obtain F, a mean effective pressure is first assumed for the engine, according to the cylinder dimensions and probable speed. For convenience, this M. E. P. is taken net, or less than the actual M. E. P. by a percentage allowing for internal friction. Its value at normal engine speeds will be from 55 to 65 pounds per square inch for ordinary engines. The bore and stroke, the number of cylinders, the circumference of the rear wheels, the ratio of gearing on the high speed, and the character of the transmission system are also known. If P equals net M. E. P., A equals piston area in square inch, L equals stroke in inches, R equals ratio of gearing and N equals number of cylinders (four cycle),

then the work done in one revolution of the rear wheels will be $\frac{1}{2} (P \pi A L R N)$.

Neglecting the transmission losses, the driving force F will be the above work divided by the circumference of the rear wheels. From the value of F thus obtained must be subtracted a percentage for loss in transmission. This percentage will vary according to the nature of the transmission system, and the writer has found allowances of from 5 to 20 or 25 per cent., according to the type of machine, to give satisfactory results.

When a car with a road gear is speeded on the track, its motor turns at a rate more or less above its normal, and the M. E. P. is correspondingly reduced. What this reduction will amount to can only be determined by trial calculations, supplemented by a body of data from known machines. Some test calculations indicate that the M. E. P. may be as low as 40 pounds under such conditions.

In the Brighton Handicap there were six entries—not counting the steamer—which were either new to the track or especially geared, and for handicapping which the formula was consequently the only reliance. The calculated speeds of two or three of these seemed on general principles to be a little too high or too low, and consequently, as the formula was still deemed to be on probation, it was stretched for these machines to give what seemed like more probable results. In all of these cases the issue of the race showed that the speeds first calculated were much the nearer right. In one instance in particular the calculated speed was many seconds faster than the best time of that machine previous to the handicap, and in the hope of making a better race a compromise was made at the last moment by arbitrarily placing this car in the next slower class. In the handicap it beat its best previous performance all to pieces, and showed a speed which would have fully justified a strict adherence to the formula.

In a word, although the formula is still by no means perfect, it is far more trustworthy than guesswork where no bonafide records can be had, and it seems wholly probably that in the next race under this formula the calculated allowances may be rigorously adhered to.

Balky Royal Auto.

While King Edward VII was riding in his automobile through Kempton Park, London, recently, his motor refused to mope and the royal auto was tied up for half an hour or more. We are informed that, unlike ordinary motorists, who on such occasions are apt to get nervous and say things, H. M. took it as a joke, descended quietly, lit a cigar, and surrounded by a rapidly increasing crowd of his loyal subjects, waited patiently till the car was ready to proceed again.

MINOR
MENTION



J. E. O'Neil, Lawrence, Mass., is building a three cylinder, 20 horse power experimental gasoline car.

It is reported that the Knox Automobile Company will adopt the Lemp Steering Check on their 1904 models.

Harry Unwin has resigned his position as secretary of the N. A. A. M. to accept a situation with a West Virginia corporation.

The Haynes-Apperson Company have just completed an addition to their blacksmith shop, and will increase their force in this department.

Chester A. Narris, Cambridge, Mass., is building a new 25 horse power, four cylinder steam racing machine for George C. Cannon.

James L. Eck, of the Boss Knitting Machine Works, Reading, Pa., is offering a kerosene burning steam car for 1904, listed at \$1,000, and called the "Boss."

Tax assessors of East Orange, N. J., have procured from the Secretary of State the numbers and addresses of all automobile owners in the city, and will levy taxes on them.

The assets of the Jones-Corbin Company, Philadelphia, Pa., bankrupt, will be sold at public auction on November 13 at the factory of the bankrupt, Thirty-first street below Chestnut.

Tom Cooper, the Detroit racing chauffeur, is said to be building two new racing machines with which he will try for honors on the track next year. The new machines will have eight cylinders in rows of four each.

The Auto Roundhouse Company has been organized at Buffalo, N. Y., by E. Leroy Pelletier, of the Duquesne Race Car Company, and J. H. Betts, of the Queen City Automobile Company. The Buffalo Cyclorama Building has been leased for a garage.

Frank W. Stockbridge, Paterson, N. J., agent for the Olds, Knox and Kensington machines, has failed, with liabilities of about \$15,000 and assets estimated to pay about 15 cents on the dollar. Local automobilists who endorsed his paper are interested to the extent of about \$4,500.

The automobile dealers of Buffalo have formed an association called the Automobile Dealers' Association of Buffalo, with E. R. Thomas president, W. C. Jaynes vice president, D. K. Lewis secretary, and H. C. Wilcox treasurer. An automobile show will be held in March.

The failure is announced of the large retail firm of H. B. Shattuck & Son, Boston, Lowell and Providence. The liabilities have been stated at \$400,000, but it is believed they will be less than \$200,000. A 15 to 20 per cent. dividend is about all that is looked

for. Mr. Shattuck is reported ill with nervous prostration.

John Fry and — Bennett have opened a garage at Riverside, Cal.

It is reported that local capitalists will organize a company to manufacture automobiles at Williamsport, Pa.

The Waltham Development Company, Waltham, Mass., will build 500 motor cycles next season, listed at \$150 to \$175.

The first meeting of the creditors of the bankrupt Foster Automobile Company, Rochester, N. Y., was held November 2.

The Boston Automobile Dealers' Association will hold its second annual show at Symphony Hall, March 14 to 19 inclusive.

It is reported that the Star Automobile Company, Cleveland, Ohio, and the Flint Automobile Company, Flint, Mich., will quit the business.

The sixteen year old son of Edgar R. Smoot, Lenox, Mass., expects to drive a White steam touring car from his home to Mexico City this fall.

G. Jason Waters, a prominent Philadelphia automobilist, has appealed against a decision of the magistrate's court fining him for alleged speed violation.

The Boston Autocar Agency, formerly in the hands of H. B. Shattuck & Son, failed, will be transferred to Fred Graves, a former employee of Shattuck & Son.

Kenneth A. Skinner, Boston, Mass., agent for the De Dion-Bouton Company, rented thirteen cars for use in bringing in delinquent voters on Election Day.

At Denver, Col., on October 29, Barney Oldfield is reported to have broken three records with his Winton racer. He made the 5 miles in 4:43, 10 miles in 9:38, and 15 miles in 14:24½.

H. H. Buffum, Abington, Mass., is building a four cylinder (4½x5½) touring car and also a two cylinder runabout for 1904. Sliding gear transmission and aluminum bodies will be features.

Many wealthy automobile owners of Chicago, Ill., are said to be dodging the police by displaying bogus license numbers, under the cover of which they violate the speed law with impunity.

The authorities of Suffolk County, Long Island, have again offered a reward for evidence leading to the conviction of any person violating the Bailey automobile law—this time \$10, however, instead of \$50, as originally posted.

The Crest Manufacturing Company report the following sales this week from their Boston office: Elmer T. Smith, Malden; Walter D. Brooks, Cohasset; L. E. Daloz, Dorchester, and J. Alford House, Bridgeport, Conn.

The nominating committee of the American Society of Mechanical Engineers has made the following nominations for officers for the coming year: President, Ambrose Swasey, Cleveland; vice presidents, Prof. D. S. Jacobus, Hoboken; M. L. Holman, St. Louis, and Wm. J. Keep, of Detroit; managers, Geo. I. Rockwood, Worcester; John W. Lieb, Jr., New York, and Asa M.

Mattice, of Pittsburg; treasurer, Wm. H. Wiley, New York.

Little Rock, Ark., is considering an eight mile auto ordinance.

The Nashua Building Company, Nashua, N. H., will erect a garage there. Plans are on foot for a reorganization of the Century Motor Vehicle Company, Syracuse, N. Y.

The Wayne Works, Richmond, Ind., will manufacture gasoline automobiles for 1904 in three sizes.

The Post Office Department is testing an electric vehicle at Philadelphia for the delivery of the mails.

After January 1 the price of the White steam touring car will be advanced to \$2,500. New agencies are now being established.

F. J. Heller, formerly connected with the Federal Manufacturing Company, has been appointed sales manager of the Standard Roller Bearing Company, Philadelphia, Pa.

The Elastic Tip Company, 370 Atlantic avenue, Boston, have adapted the Foster friction plug to automobile tires, with the object of preventing slipping and skidding.

A copy has been received at this office of the annual report of the Smithsonian Institution, Washington. It is a portly volume of nearly 700 pages and contains many articles of varied scientific interest.

The Willoughby Company, Utica, N. Y., carriage builders, are building bodies for the George N. Pierce Company, H. H. Franklin Manufacturing Company and the United States Long Distance Automobile Company.

The Philadelphia Automobile Club is retaliating for the officious zeal of the police in annoying automobile owners who frequent the park drives by starting a campaign against owners of fast horses who continually disobey the law.

The Ajax Motor Vehicle Company, 220 West Thirty-sixth street, New York city, has made an assignment to Charles G. Cornell. The company was incorporated two years ago to manufacture electric vehicles. The capital stock was \$10,000, and Alfred L. Simpson was president.

Prof. Robert H. Thurston, director of Sibley College, Cornell University, died on October 25, sixty-four years old, from apoplexy. Professor Thurston was a noted authority on the steam engine and the author of numerous technical works and papers presented to engineering societies or contributed to the technical press. A number of contributions from him on automobile subjects have appeared in THE HORSELESS AGE.

Albert and Edward Eastman, attorneys for the Chicago Motor Vehicle Company, which recently went into receiver's hands, have filed an answer in the Federal Court denying that the company is insolvent and alleging that the petitioning firm of lawyers conspired with the creditors to wreck the company. The secretary of the company declares that the assets are worth

\$700,000, and that the liabilities are little in excess of \$200,000.

At the next session of the General Assembly of Rhode Island another attempt will be made to pass a general automobile law.

During the month of September automobiles and parts were exported from the United States to the value of \$143,518 and during the nine months ending September to the value of \$1,192,829. The corresponding figures for 1902 are \$61,849 and \$847,986.

We are informed by the secretary of the Independent Automobile Association of America that the Moyea Automobile Company, whose name was given recently in our columns as one of the charter members of the association, has since withdrawn from membership.

In Sullivan County, Indiana, recently, in a suit for damages for alleged injuries received by plaintiff owing to his horse becoming frightened at defendant's automobile and running away, the judge dismissed the case, holding that the automobile has as much right on the highway as the horse and that no negligence had been shown.

The Springfield Automobile Company, Springfield, Ohio, has elected the following officers for the ensuing year: President, C. C. Bramwell, vice president, Roy McGregor; treasurer, Allen McGregor; secretary, Geo. C. Lynch. Directors: George H. Bram, O. L. Parsons and F. M. Wilson. Fifty-eight machines are being built for 1904.

Charles L. Edgar made the run from New York to Boston last week in the remarkably short time of forty-eight hours and thirty minutes. The vehicle used was a service wagon built by the Electric Vehicle Company, of Hartford, Conn., and equipped with sixty-eight cells of the new Edison storage battery. The actual running time is stated to have been twenty-two hours and fifty-two minutes and the average speed 10.8 miles per hour. The battery was charged five times on the trip for about three hours at each station.

The Chauffeur's "Snap."

A French writer claims that in touring cars as now constructed it is the "inevitable" who always occupies the most desirable place—at the side of the owner if the latter drives; in the rear of the car, in the most comfortable seats, if the owner drives and desires his wife to sit beside him, or, again, on madame's toes if the rear seats are occupied by guests.

Jacques I. (Lebaudy), Emperor of the Sahara, has issued a program outlining the methods of colonization he intends to adopt in his sandy empire. His capital, Troja, is to be connected to the caravan trading points by automobile lines. It is expected that presently some French automobile manufacturers will incorporate in their letterheads "Purveyors to H. I. M. the Emperor of the Sahara."

Club Notes.



A. C. A. Ticket.

The annual meeting of the Automobile Club of America will be held at the club house, 753 Fifth avenue, on Monday, November 16, at 4:30 o'clock in the afternoon. The governors have nominated the following ticket to fill the vacancies named: For president, Winthrop E. Scarritt, for first vice president, Henry Rogers Winthrop; for second vice president, Harry Payne Whitney; for third vice president, Wm. K. Vanderbilt, Jr.; for treasurer, Jefferson Seligman; for three governors to serve three years (class of 1906), Dave H. Morris, Sidney Dillon Ripley, Albert R. Shattuck; for two governors to serve one year (class of 1904), Harlan W. Whipple, Arthur Iselin.

MASSACHUSETTS A. C.

The Massachusetts Automobile Club is planning the erection of a new clubhouse and garage to cost \$125,000, adjoining the present location on Boylston street.

TOPEKA A. C.

The Topeka Automobile Club has perfected its organization, with J. M. Padgett president, L. B. Wyman treasurer, and R. D. Montgomery secretary.

COLUMBUS A. C.

The Columbus (Ohio) Automobile Club is making a campaign for increased membership. At a recent meeting there were twenty-five accessions, including the mayor of the city.

A. C. OF CALIFORNIA.

At the annual meeting and election of officers of the Automobile Club of California the regular ticket was unanimously elected. The following were chosen as directors for the coming year: J. D. Sprackels, R. P. Schwerin, L. P. Lowe, C. C. Moore, S. G. Buckbee, F. W. McNear and F. A. Hyde. The retiring directors are A. E. Brooke-Ridley, E. P. Bringer, Dr. D. A. Stapler, E. Courtney Ford and Byron Jackson. At the first meeting held by the directors a president, vice president, secretary and treasurer will be chosen.

A. C. OF TROY (N. Y.)

The Automobile Club of Troy was organized Friday, October 23, when the following officers were elected: President, Alonzo McConihe; vice president, Edward Murphy, 2d; secretary and treasurer, Dr. Archibald Buchanan; trustees, W. L. Gardner, H. S. Ludlow and John Squires. The charter members are Dr. Archibald Buchanan, W. L. Gardner, George B. Kelley, H. R. Kelley, James Lucey, H. S. Ludlow, Alonzo McConihe, Edward Murphy, 2d, W. E. Murphy, W. M. Peckham, George S. Robinson, John Squires, Fred

E. Brewster and J. Homer Brewster, all of Troy, and all owners of automobiles. Quarters, combined with a new and up to date garage, open day and night, with accommodations for at least twenty-five cars, are to be secured at once.

The Stearns Car Returns Over the Endurance Course.

On Thursday morning, October 22, the Stearns car, which made such a creditable showing in the New York-Pittsburg Endurance Run last month, left Pittsburg in an attempt to make a new record over the Endurance Run course. Rain and tire troubles prevented the party from completing the run in as short a time as had been the original intention, but New York was reached on Wednesday morning of last week.

The car was driven by James P. Patton, of the Stearns factory.

New Incorporations.

Jackson Motor Carriage Company, Jackson, Mich.—Capital stock, \$30,000.

Toronto Automobile Manufacturing Company, Toronto, Canada.—Capital \$50,000. Shareholders principally doctors.

Richmon-Jarvis-Caro Company, Grand Rapids, Mich.—Garage business. Capital, \$50,000. Secured the Rambler agency.

Baker Motor Vehicle Agency, of New York city.—Capital, \$25,000. Directors, J. E. Delmar, Louis Hall and A. B. Rulison.

Reid Manufacturing Company, Detroit, Mich.—To manufacture Wolverine two cylinder gasoline cars. Capital stock, \$300,000.

The Western Automobile Company, St. Louis, Mo.—Capital stock, \$10,000. Stockholders, Marion L. J. Lambert, Samuel Brendon and Samuel B. McPheeters.

American Motor Company, Portland, Me.—Capital stock, \$150,000, \$15 paid in. President, H. C. Houston; treasurer, G. M. Holmes.

Field Motor Carriage Company, Auburn, Me.—Capital stock, \$100,000. President, A. H. Nelson; treasurer, A. P. Norton; clerk, Harry Mauser.

Smith & Mabley, Incorporated, New York city.—Capital stock, \$500,000. Incorporators, James H. Richards, Alfred L. Brown and John C. Dyers.

General Automobile Company, Cleveland, Ohio.—Capital, \$10,000. Incorporators, George A. Gaston, C. B. Lewis, Robert T. Gage, H. G. Roesch and C. K. Faure.

Toquet Motor Car and Construction Company, New York.—Capital, \$25,000. Directors, B. L. Toquet, Westport, Conn.; Oscar Wuera, Conrad Stein, New York.

Tri-State Automobile and Supply Company, Memphis, Tenn.—Capital, \$3,000. Incorporators: L. M. Hall, F. F. Hill, W. T. Arrington, G. W. Browne and Caruthers Ewing.

MOTOR VEHICLE PATENTS..

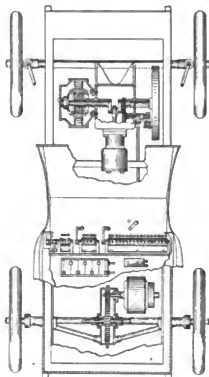


United States Patents.

740,273. Motor Car.—Robert H. Hassler, of Indianapolis, Ind. September 29, 1903. Filed November 20, 1902.

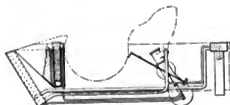
Refers to a combination gasoline-electric vehicle, and particularly to the control arrangements.

When the engine is being started the igniter switch is closed and the dynamo switch thrown into the starting position. This temporarily converts the dynamo into a low voltage motor, with the armature connected to the battery and the field coils in parallel with each other, and also connected across the battery. This connection results in a rush of current, which starts the engine rotating until the explosions occur in the cylinder with sufficient force



No. 740,273.

to run the engine. The operator then turns the dynamo switch to the running position. The dynamo now becomes a high voltage generator, its fine wire field coils being connected across the armature, but in series with each other, and the dynamo is also disconnected from the battery. The engine is prevented from racing by the fact that the controller is in the "off" position, and the contact device makes a late spark, which not only causes the engine to start in the right direction but also keeps the engine speed down while the dynamo is disconnected from its load. The engine now being started, when it is desired to start the vehicle the controller switch is



No. 740,207.

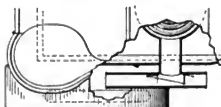
thrown to its "first speed" position. This operation electrically connects the dynamo with the vehicle motor through a resistance and at the same time advances the spark by mechanically shifting the insulated brush on the make and break device. The vehicle now runs at a slow speed, partly owing to the resistance inserted between the dynamo and the motor and partly because the spark has been advanced only a little.

For full power the operator throws the controller C to the "second speed" position. The dynamo is now directly connected to the motor and the spark simultaneously shifted to the full power position, where the engine runs at its highest speed.

740,207. Condenser Mechanism for Steam Carriages.—Rollin H. White, of Cleveland, Ohio. September 29, 1903. Filed April 21, 1902.

The condenser consists of two sets of flanged tubes, the tubes of each set being in parallel with each other and the two sets in series with each other. All the tubes are led into a header with a single compartment at one end, while at the other end the tubes of one set are led into one compartment of the header while those of the other set are led into a second compartment of the same header. The radiator is placed with its tubes horizontally and one set behind the other. The exhaust steam enters through the rear set and the condensed water is pumped from the bottom of the header compartment into which only the front set of tubes enter into the top of a filtering box. This box has a transverse perforated partition near its lower end, and contains waste which prevents the oil in the condensed water from passing through it. From the bottom of the filter box a pipe leads to the upper part of the water tank.

740,208. Stack Construction for Steam Carriages.—Rollin H. White, of Cleveland,



No. 740,208.

Ohio. September 29, 1903. Filed November 17, 1902.

It is desirable that the stacks discharge the products of combustion at such points that the passengers will not be annoyed thereby, and it is also necessary that there shall be a sufficient draft through the stack to promote proper combustion at the burner. This problem has heretofore been most satisfactorily solved by turning the stack downward, so that it discharges beneath the carriage, and by discharging the exhaust steam into this downturned stack, so as to create therein a forced downdraft. It is not practicable, however, to use a downturned stack in a steam carriage which condenses the exhaust steam, because there is no way of creating the necessary downdraft. By the construction provided by this invention the desired results are satisfactorily attained without using the exhaust steam to create draft.

The upper end of the burner hood is closed, save for two laterally extended draft tubes, which extend out through the sides of the body, where they discharge into the horizontal longitudinally extended stacks between the ends of said stacks.

The forward movement of the carriage creates an air current rearward through these longitudinal horizontal stacks. Under certain conditions which arise in practice these air currents entering the front ends of these stacks might produce a back pressure in the draft tubes and thereby diminish the normal draft. To prevent this, when the carriage is moving forward, a hinged deflector is placed at each side of the opening of the draft tube into the stack, the two deflectors being connected to each other by a wire of such length that when one of the deflectors extends as far as may be across the stack the other one lies flat against the side thereof.

When an air current is flowing rearward through the stacks, whether due to the for-

ward movement of the carriage or to the wind, entering the front end of each stack it will by its action upon these deflectors cause them to assume the position shown in the drawings. If the direction of the air current in the stacks is reversed, the current will automatically reverse the position of the deflectors. The deflectors act to prevent the air current from entering the draft tube.

740,209. Steering Mechanism for Automobiles.—Rollin H. White, of Cleveland, Ohio. September 29, 1903. Filed December 1, 1902.

The invention relates to the combination of a steering gear, steering post column and a concentric throttle operating shaft. The steering mechanism is of the regular worm and worm screw type, and presents no particular novelty, but the design of the enclosing casing and the manner in which it is secured to the vehicle frame are of interest. The joints in the steering gear are of the ball and socket type, with means for adjustment and means for locking the adjustable parts. A threaded sleeve over the steering shaft screws into the lower end of the casing and takes up the end thrust of the worm.

740,184. Anti-Skidding Device for Vehicle Wheels.—William Draper Sainsbury, of Dublin, Ireland. September 29, 1903. Filed June 13, 1903.

The invention provides a construction comprising treadward projecting horns attached to the rim of the wheel and which in normal running of the car are adapted to rise and fall with the tire without injury to the latter, but which when the tire skids, side slips or rolls will come in rigid contact with the ground, dragging sidewise thereon to prevent such skidding or side slip. The drawing shows the arrangement very clearly.

740,409. Lubricator.—John A. Erickson, Malden, and Franz W. Young, Everett, Mass. October 6, 1903. Filed February 3, 1903.

740,666. Automobile.—Frank M. Leavitt, New York, N. Y. October 6, 1903. Filed February 6, 1903.

740,698. Rotary Speed Indicator.—Heinrich W. Schlottfeldt, Kiel, Germany. October 6, 1903. Filed November 23, 1901.

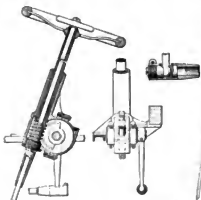
740,781. Electrical Sparking Igniter for Gas Engines.—Thomas L. Sturtevant, Quincy, and Thomas J. Sturtevant, Newton Center, Mass. October 6, 1903. Filed October 9, 1901.

740,877. Clincher Tire for Vehicle Wheels.—Albert de Laski and Peter D. Thropp, Trenton, N. J. October 6, 1903. Filed July 11, 1903.

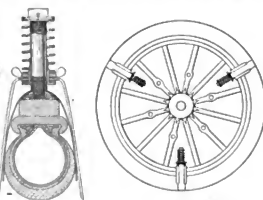
740,895. Vehicle Body.—Charles J. Moore, Westfield, Mass. October 6, 1903. Filed December 8, 1902.

740,896. Motor Vehicle.—John H. MacAlman, Somerville, Mass. October 6, 1903. Filed November 23, 1901.

740,897. Automobile Body.—John H. MacAlman, Somerville, Mass. October 6, 1903. Filed February 24, 1902.



No. 740,209.



No. 740,184.

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Next Year's Gordon Bennett Race.

Abroad a more widespread interest is being aroused in the Gordon Bennett Cup Race this year than ever before. While the largest number of clubs represented in any previous cup race was four, it is now tolerably certain that next year will see at least six teams in the field. The national clubs of Great Britain, France, Belgium, Austria and Italy have all either already sent in their challenge to the German Automobile Club or are preparing to do so. The time for depositing a challenge expires on January 1.

In the United States there seems to be less enthusiasm about entering the race this year than last. Aside from the fact that Barney Oldfield recently expressed a wish that he might be a competitor in next year's race, no manufacturer seems yet to have volunteered to represent the colors of the A. C. A. The club has just sent out an invitation for entries to all its members and to the manufacturers, in which it is stated that entries will be received until December 15, and that they must be accompanied by a deposit of \$600, which will be returned if the A. C. A. starts. It is most likely that the A. C. A. will be represented by at least one starter; but it is doubtful whether it will have a full team in the field. The condition that the driver must be a member of the A. C. A. will presumably not bar anyone who might wish to compete. On the other hand there is much less talk now of winning a leading position in the industry by some sensational racing performance than there was last year. It must also have been noticed that some of the largest manufacturers who built special racing machines were not represented in the later track events of the season. If we can draw a conclusion it must be that these manufacturers have convinced themselves that "the game is not worth the candle." Winning the Gordon Bennett Cup Race has, of course, an enormous advertising value, but the expense of competing if

commensurate efforts are made is very considerable, especially for American competitors, and with perhaps twenty starters the chances of success for the individual contestant are rather small.

Meanwhile the running of the race on German territory next year appears to be assured. The German Emperor has not only expressed himself as favorably disposed toward the event, but has gone so far as to offer a trophy for the best performance with an alcohol driven car, if such cars should compete.

The "Car Beautiful."

The average present day automobile is declared to be hideously inartistic by Sir William Richmond, a member of the Royal Academy and well known artist, who promises to remedy this defect and shortly bring out a design, modeled in wax, which shall realize the highest artistic ideals and at the same time satisfy all practical requirements.

The point in present cars with which particular fault is found is that the ends are too abrupt, and the car does not suggest speed or volition, as Sir William Richmond thinks it should. The bird's beak and the horse's head and shoulders suggest cleaving the air and forward motion, and to secure the same effect in an automobile Sir William will provide a prow; the car will also be broadened in the beam and narrowed in the stern, and the driver will sit in the stern.

The announcement of this coming revolution in motor car body design has met with a varied reception from the trade and the press. Some take Sir William Richmond seriously, probably more on account of his reputation as an artist than for anything else, and one English contemporary proposes to name the design that is to be "The Richmond," just as other vehicle types have been named after their originators—Stanhope, Brougham, Goddard, etc. Others, including apparently the greater part

of the trade, regard the ideas advanced as visionary and impractical. One manufacturer holds that the present arrangement with motor in front has met the demands of mechanical efficiency and durability, which is essential, and that any attempts to give the vehicle a suggestion of motion, by providing, say, a swan's head on the bonnet, which could be removed when the engine had to be visited, would be bound to fail of popular approval. Dealers also claim that the finest types of present automobile perfectly satisfy customers in this respect.

There is absolutely no doubt that in the rational development of automobile design practical requirements should be met first and then the body be given as pleasing an appearance as possible without interfering in any way with its comfort, convenience and general practical qualities. It is therefore self evident that automobile body design is a proper subject for those thoroughly familiar with the practical requirements, and not for a decorative artist. The mistakes which will be made by the latter are well exemplified in the present case by the provision that the driver shall sit in the rear, "like the steersman of a boat." Every automobilist of experience knows that by far the most suitable position for the driver in a vehicle with more than one seat is on the front seat. It is only when seated in the front seat that he can always clearly see the road ahead, and, moreover, the front position is much more convenient for the arrangement of the control devices if the motor is located in front. There is no doubt that the present styles of bodies can be improved, but improvement will proceed along conservative lines.

The cry about the supposed ugliness of automobiles was first raised a good many years ago, and it is now six or seven years since the *Paris Figaro* instituted a competition for aesthetic automobile body designs. The designs submitted at the time were for the most part highly extravagant and fantastic, not one of them having come into practical use. Sir William Richmond might do well to look up these designs as examples of what to avoid.

At the late Paris Exposition was shown a car with a body in the style of the court sleighs of a former century, richly carved and decorated in red and gold. From an artistic standpoint we presume this body was a masterpiece, and as a show stand attraction it was a winner; but no sane man of the present age would go riding on the public roads in such a conveyance.

The Production of Crude Rubber.

In recent issues of the United States Consular Reports a number of articles have appeared anent the situation in the rubber producing countries. As is well known, the bulk of crude rubber is produced in Brazil, and the finest grades, which are used to a large extent in the manufacture of vehicle tires, are grown in the valley of the Para River. During the month of August last the exportation of crude rubber from Brazil was smaller than it has been during any other month for the last six years. This apparent sign of a decline in the production of rubber in this field, together with the recent increase in prices, has naturally led to some anxiety respecting the future of the sources of rubber supply. Careful investigation has shown that in the very districts in which the best grades of rubber are produced the forests are rapidly being destroyed. The high price of rubber has induced many men to go into the rubber gathering business who have little or no knowledge of the proper method of "bleeding" the rubber trees, and simply cut the trees down, with the result that the forests are rapidly being destroyed.

Several experts who have recently investigated the situation recommend stringent measures to protect the rubber forests against such wanton destruction, and predict an early deficiency in the supply unless some such measures are adopted.

In some of the rubber districts the natives have been found to adulterate the rubber with foreign substances to increase their gain, and these adulterations usually have a very detrimental effect on the quality of the rubber. The Government of French Guinea a little over a year ago issued a decree forbidding the exportation of adulterated rubber, it being feared that if the dishonest practice was not checked in this manner the reputation of the rubber produced in the French West African colonies might be seriously injured. The French Government, moreover, is making every effort to encourage the production of crude rubber in its African colonies, and has established a training school in the Soudan where the natives are taught the best methods of culture and preservation of the trees, as well as the best methods of gathering the juice and its coagulation.

Successful attempts have recently also been made in planting Para rubber trees in Ceylon and the Malay Peninsula, and in the latter district alone there are now at

least 12,000 acres under cultivation with the rubber plant. The report of success is the more gratifying for the reason that an earlier attempt of planting the Para rubber tree in India proved a complete failure.

It will thus be seen that rubber cultivation is being taken up in the tropical sections of both Africa and Asia, and as in these colonial dependencies of European countries more scientific methods will undoubtedly be employed, tending to preserve the trees, there is little cause for alarm regarding the future supply of crude rubber. Probably the Brazilian Government will also adopt stringent measures for the preservation of its rubber forests once the results of the present devastation become thoroughly apparent.

Automobile Riding and Inflammation of the Eyes.

In the *Medical Brief* of October 13 Dr. A. Edward Davis states that during the past year he has observed several cases of conjunctivitis, acute and chronic, which could be attributed to no other cause than rapid riding in automobiles with the eyes unprotected. The direct causes of the inflammation are said to be the friction of the wind against the sensitive covering of the eye and chilling of the eyeball. The three characteristic symptoms of the affliction, which differs from ordinary chronic conjunctivitis in two or three respects, are (1) congestion of the ocular conjunctiva almost solely; (2) the deeper conjunctival and subconjunctival tissue being markedly affected, and (3) a slight watery discharge, attended by but little itching and burning.

As the wind and the cold are the specific causes of the inflammation, it will be recognized that when out for extended automobile trips, during the late fall and winter particularly, it is important to protect the eyes with goggles or eye shields. The doctor fails to mention the effect of road dust on the eyes, which to our thinking must be at least as harmful as the wind or cold. However, closely fitting goggles or eye shields will protect the eyes against this danger as well.

The remedy for this sort of eye inflammation, according to Dr. Davis, consists in the application of cold compresses to the eyes for fifteen minutes at a time, three or four times a day, and the application of mild astringent washes by means of an eye cup twice a day. In cases latent and chronic inflammation of the deeper eye tissues may be made active again by driving

in the cold, and in such cases riding in the open must be discontinued, the active use of the eye for close work avoided and an oculist consulted.

Elementary Explanation of Gasoline Motor Principles.

In another part of the present issue we publish an article giving an elementary explanation of the working principles of the four cycle gasoline motor, written on lines similar to the "Beginners Page" series of articles which concluded some time ago. Quite a number of the issues containing instalments of this series are now out of print, and as there is a constant demand for an issue containing a simple explanation of the operation of the gasoline motor the present article was written. For purposes of illustration we have chosen the single cylinder horizontal or American type of engine, which is now used by a considerable number of manufacturers. This type is not quite so well suited to illustrating the motor principle as an engine with the two valves in line with each other, as it requires two views instead of one to clearly show all the essential working parts; but it is more largely used than the other type, and especially by owners who drive themselves, which makes it preferable in the present case. We shall follow this article up in a few weeks with another on the planetary transmission gear—a common feature of nearly all gasoline runabouts.

The Coming National Shows.

While at one time rumors were afloat that owing to the alleged intention of the Association of Licensed Automobile Manufacturers to influence visitors at the New York and Chicago shows by displaying signs warning against buying any but "licensed" machines the unlicensed manufacturers would refrain from exhibiting, it is now stated by the N. A. A. M. management that both shows will be thoroughly representative of the American industry, and that for the Chicago show more applications for space have been received from unlicensed than licensed manufacturers. No one doubts that all the members of the "Licensed Association" will display their membership signs at the show, but it is not believed they will go farther, bending their efforts to confine the war which has broken out to the courts—a decidedly sensible policy. Under these conditions the independent manufacturers would have little

reason for refusing to exhibit, and by so doing could only hurt their own interests.

These larger shows are particularly valuable to manufacturers in securing desirable agents, and it is not easy to see how the opportunities lost by failure to exhibit at them could be retrieved. Opposition shows could hardly be thought of. While not quite outpoken on the subject, the management practically admits that the A. L. A. M. exhibitors will not resort to any such means of advertisement at the coming shows as has been intimated they would. The management, moreover, has it within its power to prevent any attempt of this nature, as the rules empower it to pass upon all exhibits, literature distributed, etc.

More Race Fatalities.

Sunday last, November 8, was the date of the annual Gaillon hill climbing contest at Gaillon, Departement Eure, France, and proved to be another day of sacrifice to the Moloch Speed. It was a cold and chilly autumn morning, the country being enshrouded in a heavy fog which made it impossible to see the road a safe distance ahead. The contestants, who numbered nearly a hundred, arrived at the scene at an early hour to make a preliminary spin up the hill and get their bearings. The entries included vehicles up to 100 horse power, developing tremendous speed even on the severe grade, and as the view ahead was cut short by the fog the speeding was exceedingly dangerous. Danjean, who had piloted a Georges Richard-Brazier to victory in the hill race at Chateau Thierry a month earlier, ran off the road into a ditch and was buried under his machine, receiving injuries from which he died inside of an hour. A Serpollet racer, occupied by five foremen from the factory, in making a preliminary dash up the hill, crashed into a tree at the side of the road with tremendous force, hurling all five occupants out, killing two instantly and seriously injuring the others.

Sample of French Auto Humor.

The preceptor had just read to his class a chapter from ancient mythology—how Hercules, when he came to the crossroads, hesitated which one to take, the road of virtue or the road of vice—and asked the class which road he should have taken. The scholars, who had been using the motor bicycle during vacation and knew something about roads, were unanimous that the one which was tarred would have been the proper choice.

Hill Climbing Power of Gasoline Cars.

By ALBERT L. CLOUGH.

Hill climbing power is a characteristic of the motor car about which much interest rightly centres. It is a far more important consideration than the attainment of high speed, and to a certain extent is incompatible with it. The hill climbing power of many cars has been sacrificed to the speed ideal, and oftentimes to considerations of simplicity and cheapness of construction of the change speed gear.

The capacity of any gasoline vehicle to overcome grades is dependent upon (1) the total piston displacement per stroke of the motor; (2) the efficiency of the transmission elements between the motor and the vehicle tires; (3) the diameter of the driving wheels; (4) the gear, i. e., the ratio of engine revolutions to driving wheel revolutions on the lowest gear, and (5) the total weight of the vehicle loaded.

The relation may be expressed thus:

Hill climbing capacity $\propto \frac{D \cdot \epsilon}{W \cdot d}$,
where D is the total piston displacement per stroke (account being taken of the number of cylinders); ϵ , the total efficiency of transmission as previously defined; g, the gear, as specified above; W, the weight, and d, the diameter of the driving wheels. This formula may occasionally prove of assistance in comparing the performance to be expected of different vehicles, if like quantities are always expressed in the same units, but, like almost all mathematical expressions obtainable in the present state of the automobile art, it is really of very little value, owing to the following considerations: Piston displacement is a very poor criterion of the energy delivered per cycle by a gas engine, because different motors of the same bore and stroke vary in regard to their compression spaces; the tightness of their valves and pistons; the degree of expansion of the charge; internal friction; the pressure and temperature at which the charge enters the cylinder; the quality of the mixture; the correctness of the spark position; the adequacy of the exhaust valves and their timing; the muffler back pressure, etc. As it is practically impossible to obtain all this data in suitable units, to determine what effect the different variables would produce, and to incorporate them into any usable mathematical expression, we are without any means of comparing what different gasoline engines are actually delivering per stroke, except by a brake test.

Furthermore, the efficiency of transmission depends upon so many obscure conditions that it can never be determined with any exactness short of an actual test. The losses in clutches in the tooth friction of spur and bevel gears, in the bearings of transmission shafts and axles, and in the sprocket and chain gear and universal joints are values which vary with the speed and torque existing in the parts concerned, with the alignment of shafts, the correctness of

tooth outlines, the exactness of the pitching of chains and with the lubrication. Very few, if any, tests of transmission gear efficiencies have been made and given to the public in this country, and while a considerable amount of work on this subject has been done abroad the results are not always fully applicable to American practice. The transmission efficiency obtained by test for a certain machine when running at a certain speed, on a certain gear, with a known absorption of power, is not necessarily exactly that of the same machine when a greater or less amount of power or speed is involved, and is certainly not the same when running on a different gear, owing to there being more or less gears concerned, running at greater or less speeds and for other reasons. The transmission efficiencies of different individual machines of the same make and model may be widely different, owing to deformation of the tooth outlines of gears or their incorrect pitching, the looseness and consequent misalignment of shafts, or any undue tightness in their bearings, the dragging of idle clutch bands, the stretching of chains, so that their pitch is no longer correct, and differences in lubrication.

Different types of machines, employing widely diverse transmission systems, would naturally be found to possess efficiencies differing very markedly. The American light runabout when running on the high gear must possess a very high efficiency of transmission, as the driving sprocket forms virtually a part of the engine shaft, and there should be hardly any loss between the engine and the tires, except the chain and sprocket friction, as the rear axle is generally ball or roller bearing. Sometimes a slight loss is occasioned by the contact of the low and reverse gear straps upon their drums. Probably no type of automobile which has ever been built wastes less power than such a machine on the high gear. When, however, it is running on the low gear, not much can be said in commendation of its transmission efficiency, as the planetary gear is too often made in the very cheapest manner, and the small internal pinions are believed to constitute an arrangement excessively wasteful of power, although this belief may not be true of all planetary combinations, and in the absence of published tests cannot be definitely asserted. It is at least true that in no type of automobile is the good efficiency of the high gear so strongly in contrast with the inferior low gear efficiency as in the typical American runabout.

However, gasoline cars in general have unfortunately a lower efficiency of transmission on the lower gears than on the high speeds. This, while apparently inevitable, is unfortunate for the reason that it is just when a car is operating upon its lowest gear, negotiating an especially bad grade or sandy stretch, that one needs the highest net horse power that the engine can furnish to the wheels, and at that very time we have to be satisfied with the lowest, owing to the

gears that are in action and the very powerful torque which is acting upon the transmission shafts, tending to increase friction, to force them out of alignment and at every point to exaggerate the frictional losses.

There is no such difference between the high gear and low gear efficiencies in the case of the clash gear and individual clutch systems as exists among the planetary systems, for in the two systems mentioned there are always the same number of gears in mesh (not considering the reverse), and the change of gear merely produces a change in the relative speed of the driving and driven spur wheels. Furthermore, the clash and individual clutch transmissions are generally more substantially built and less shaky and springy than some of the planetaries, and the increased torque of low gear work has less evil effects.

The impossibility of exactly comparing gasoline engines on the basis of their piston displacement and the total lack of information which exists regarding transmission efficiencies render any attempt to predict the hill climbing power of cars almost futile, and still some conception of the relative grade negotiating capacity of two cars may be obtained by the use of the formula with the transmission efficiency ignored or estimated. The result will be what has been called an "educated guess," and that is the kind of figuring that we shall have to be satisfied with in the gasoline automobile business for some time to come. If one has a machine of satisfactory hill climbing powers, but is contemplating the purchase of another machine, it would certainly be worth the time and trouble involved to apply the formula to his old machine and then to the contemplated purchase, and, if the result was much smaller in the case of the latter machine, to hesitate a little before buying.

It must be perfectly obvious that any machine which has an engine capable of giving any net power, and a transmission system of any efficiency at all, must theoretically be capable of climbing any grade in case the gear be low enough. This is practically true to a considerable extent. Many a poor hill climber may be made a good one by a reduction of the teeth in the driving sprocket or an increase of those of the sprocket on the axle, but this increase of hill climbing ability will inevitably be at the expense of the maximum speed of which the vehicle is capable. Hill climbing power may always be indefinitely increased with a corresponding diminution of speed capability, and on the other hand speed may be largely augmented, up to the point where air resistance becomes the governing factor, with a corresponding reduction in ability to overcome grades. It is rather astonishing that the owners of machines which are ineffectual hill climbers but speedy on the level are not willing to sacrifice a little of their swiftness in order to successfully meet severe grades. Almost every owner accepts his machine as geared at the factory and prefers to discard the car rather than to in-

vest a few dollars in new sprockets, and thus lose his fear of hills.

Of course, a point may be reached in gear reduction for hill climbing at which it becomes useless to carry the process further, and this is the point at which the driving wheels begin to slip on fairly good footing. The slipping point for a certain tire is determined by the weight which it is carrying. In order to increase the traction and defer the slipping point, the vehicle weight should be largely concentrated upon the driving wheels; but of course the application of this rule is greatly restricted by the undesirability of unduly overloading one pair of tires, and also, perhaps, by the dangers of increased skidding said to arise from an unequal weight distribution. The typical French touring car has sometimes been criticised on the ground that too little of its weight is carried by the driving wheels, on account of the engine being placed directly over the front axle and nothing being directly supported by the traction wheels, except the tonneau load and perhaps a tank and the muffler.

The majority of cars of the American type carry a greater proportion of their total weight on the driving than on the steering wheels, and some of them perhaps carry the weight somewhat too far toward the rear. In quite a number of these cars, particularly those using the double opposed horizontal type of engine, the longitudinal centre of gravity must be nearly midway between the axles. A great many people appear to think that this is the proper place to have it, in order to secure the greatest degree of immunity from skidding. Failure of traction on good footing is a phenomenon not very commonly met with, and loss of adhesion in sand or mud would in some cases find a doubtful remedy in any increase of weight applied to the slipping wheels.

(To be concluded.)

Traction in Sand.

By JAMES G. BLAINE, JR.

A machine that will ordinarily climb a steep grade on the high speed, provided the road is hard, will often stall completely when it comes to a deep sandy stretch, and it is only by using the low gear liberally, and in some instances, especially with a large touring car, by the disembarking of most of the passengers, that it can make its way through at all.

I have noticed several large touring cars rated at many horse power that would climb almost impossible grades on hard roads, even if rough and stony, that labored under a severe strain to make their way through bad sandy roads which could very easily be improved by a small amount of straw being distributed over the worst places.

Southern California is noted for its "straw roads," and there are stretches of road which became so nearly impassable that this was the only recourse. It is surprising to see the effect that a small amount

of rotten straw will produce in these bad places. Before its application the road may have been cut up so badly that a heavily loaded wagon would require four to six horses to pull it through, and then wheels would cut into a depth of 4 to 6 inches, but when the straw has been applied it makes it almost as solid as the hard dirt road. The straw seems to work into the sand and alter one or two rains will be of the most resisting nature.

For the past three years I have been running two different types of carriages, both steam and gasoline, and I find that one is very little ahead of the other when it comes to negotiating sand. The steamers require the maximum boiler pressure to make their way through these bad stretches, and this can only be maintained by stopping at intervals to allow the boiler pressure to rise, for the work uses up steam far more rapidly than the average boiler will supply.

The first machine used was a light steamer of 700 pounds, with a 5 horse power engine, and as this was found to be too light for such sandy roads, a larger machine was secured, with results very little better. That is where the trouble seems to lie. If you increase the horse power the machine increases in weight at almost the same ratio. Not only is this true with steamers but also with the gasoline machines.

I am now using a 10 horse power double cylinder gasoline machine, which weighs about 1,450 pounds, and its behavior in sand is about the same as the lighter rigs with less horse power.

All of the machines which recently crossed the continent experienced the sand difficulty in its true sense. Of course the ordinary roads are nothing to compare to the roads which run across Nevada and the Western States, but even on our main traveled roads a long stretch of sand will be encountered and generally with the above results.

The main question with residents in this kind of country is "What kind of a machine will do the work best?" If you buy a light machine the horse power does not seem sufficient, and if you increase the horse power the weight increases also.

Of course if there were enough residents in this sort of country who used automobiles to become interested in the "good roads movement," it might be an easy matter to overcome most of the difficulty by making better roads, but it is, and always has been, a case of "Well, if I can get through the other fellow should be able to," no matter how much trouble the first party may have had in accomplishing the desired result. The "good roads movement" is rapidly spreading, but there are sections where it will be some time before any work of great value will be done in this line.

It is seldom a case of "slipping the wheels" in this sand either, for it is deep and not loose, but just resisting, and the

wheels sink down and your engine stalls. By working the machine backward and forward on the low gear you will, in time, be able to work the way through after using a great deal of strong language, gasoline, cooling water and last, but not least, a lot of "elbow grease" in the manipulation of many levers, but this sort of riding is very disagreeable to both the driver and the occupants of the rig.

Maybe in the near future someone will discover a machine that will come as a healing balm to the man who must bore through sandy hills, but it is not to be found on the market today. Some of the machines are better than others, but they all lack "something" for this particular class of work which no one seems to be able to figure out. Until the time comes when we will have a machine which will plow its way through sand without making "snowplow bucks" into it the occupants who are unfortunate enough to have to travel over such roads must be contented with what they have, and try to make up for their lack of comfort when running over such places by the comfortable travel which may be had on the average hard roads.

Automobile Wheels.

(Paper presented to the Second International Automobile Congress by Commandant Ferrus. Condensed.)

(Concluded.)

WOOD WHEELS FOR HEAVY VEHICLES.

The driving wheels of trucks and delivery wagons intended to run at a fair speed are generally shod with steel tires, both for economical reasons and because pneumatic tires are at present impracticable for loads above 4,400 pounds. For wheels of this sort elasticity is a very important feature. The wheels are constantly subjected to extremely violent shocks the greater part of which must be absorbed, especially if the wheels are heavy, which is almost imperative. If the wheels are devoid of elasticity, each shock results in a corresponding permanent deformation, and the wheel is destroyed in short order. If, on the other hand, they are elastic, the points struck may undergo a certain displacement under the influence of the speed impressed by the body causing the shock, without permanent deformation. Morin also claims that elastic wheels reduce the draft (see "Tirage des Voitures," first part, pages 400 and 163): "A wheel in bad condition . . . no longer forms a sufficiently rigid and elastic body to admit of the restitution of the energy absorbed by deformations in the same degree as a wheel in good condition, which may be regarded as a perfectly elastic body."

From the foregoing it follows that wheels for speedy trucks must be elastic, and that if they are shod with steel tires they must be constructed of wood and

suitably dished, or comprise springs in their makeup. The use of rigid wheels is inadmissible, except with rubber tires, or perhaps with wood tires admitting of localizing the deformations in a deformable rim. Successful experiments along this line have been made on Scott tractors which are very heavy but run at relatively low speeds.

The foregoing applies exclusively to driving wheels supposed to be placed outside the plumb line of the motor, which is generally located in front. Experience seems to have shown that motors suffer quite rapidly when supported on steel tired wheels. The use, if not of pneumatic tires, at least of solid rubber tires or of spring wheels—if a sufficiently strong construction of this type exists—is therefore advisable for steering wheels of trucks and delivery wagons.

As to heavy traction vehicles properly so called, which run at slow speeds only, the best type of wheels to use seems not yet to have been settled upon. At the present moment the choice seems to be limited to wood wheels with combined steel and wood rims (Scott type), which possess valuable anti-skidding and anti-slipping properties, and wheels of pressed steel, which, although completely inelastic, are nevertheless practicable. The rules of the motor truck contests which are this year (1903) being held in England and Austria specify the use of pressed steel wheels. These rules require the wheels to be 68 to 80 inches in diameter, with 16 to 20 inches width of rim.

The nature and the width of the rims to be employed are even less settled than the type of wheel. The Department of Roads and Bridges, basing itself upon experiments which have been carried on, and which have proven disastrous to the maintenance of the road surface, seems determined not to allow heavy motor vehicles to run continuously on certain stretches of road without imposing upon the owners of these vehicles a tax corresponding to the damage done to the road surface. Consequently it is of the most vital interest to the manufacturers to eliminate these causes of damage to the road, or at least to reduce them to a minimum. The only method available consists in employing tires of from 8 to 9 inches in width, or even larger still, if necessary. This method has not yet been applied, the greatest width of tires so far used being less than 6 inches. The example of the trucks used for transporting cut stones from the quarries to Paris, and that of the steam trucks employed by the Say Sugar Refinery, seem to indicate that the problem is not impossible to solve. However, prolonged experiments will be necessary. Let it be added that since the operation of these vehicles should be, as far as possible, independent of weather conditions, it would be desirable to contrive appliances permitting heavy traction vehicles to run during periods of snow and even glazed frost.

MOST ADVANTAGEOUS WHEEL DIAMETER.

Theorists have often attempted to determine by calculation the most advantageous diameter of the wheels. Unfortunately, they are not even agreed upon the data upon which their calculations are based. Some consider the draft inversely proportional to the square root of the wheel diameter (Dupuit); others claim it to be inversely proportional to the wheel diameter itself (Morin). It appears that the latter are correct.

The results obtained by Morin are in accordance with those of Coulomb, who was the first to establish the laws of friction, and these results are based upon a large number of experiments conducted during several years with various types of vehicles and wheels. In the work of Morin on the draft of vehicles may be found tables containing the results of 170 experiments on the influence of the diameter of the wheels, 267 on the influence of the speed, and 175 on the influence of the width of the rims. Morin had been officially charged with making experiments to serve as a basis for a new road law, after having received the approval of the Academy of Sciences.

Dupuit, on the other hand, made only a small number of observations deserving any confidence, a total of twenty-six, and these observations were made on wheels of only five different types. It is therefore generally admitted, with Morin, that the traction effort is inversely proportional to the wheel diameter, proportional to the vehicle weight, and independent of the width of tires within certain limits.

Starting with these facts as a basis, it is possible to calculate the most advantageous wheel diameter for ordinary vehicles carrying a given load, the nature of the surfaces in contact being determined in advance. While this may be an excellent exercise in algebraical calculations, it has no relation to the actual problem, on account of the multiple hypotheses which it is necessary to make, and, as might be expected, the calculation gives the most varied results. The problem is still far more difficult to solve for automobiles. It should be remarked that the experiments of Morin, however much confidence they may deserve, were made exclusively with steel tired carrier wheels. To apply their results without reserve to driving wheels fitted with pneumatic rubber tires would be somewhat risky. In this connection we would call special attention to the following point:

All authors agree that the friction of rolling motion diminishes as the diameter of the wheel increases, and in ascribing this phenomenon to the variations in the extent of contact surface between wheel and ground. It has too frequently been overlooked that with pneumatic tires of similar construction, and with a given weight and a given pressure, the contact surface between tire and ground is constant. It is therefore to be concluded that

for roads which are not too much cut up the draft is independent of the wheel diameter within reasonable limits. Another fact to be considered is that in automobiles the use of wheels of large diameter necessitates a greater ratio of speed reduction from motor to road wheel, entailing greater friction losses. In increasing the wheel diameter the loss may therefore be greater than the gain, and the excellent results obtained with small, directly driven wheels by M. Jenatton substantiate this possibility.

It would appear that the wheels at present employed, mostly 32 or 36 inches diameter, leave little to be desired from this point of view. The range of possible diameters is, moreover, limited by all sorts of considerations, among which we will only mention the desirability of having all four wheels of an automobile equal in diameter. This consideration fixes the upper limit of the diameter, as with very large front wheels the car could not be turned in a sufficiently small radius. On the other hand, the weight and frailty of wheels increase very rapidly with the diameter. It is needless to insist upon the increase in price of the tires.

There is, therefore, little probability that anything could be gained by increasing the wheel diameters actually used, and there is no more probability of anything being gained by reducing them. Wheels of 28 inches diameter, commonly used on bicycles, surmount even small obstacles, such as a street curb, with great difficulty. Such wheels, of course, possess greater structural strength than those of larger diameter, but the tires on them wear out more rapidly.

The argument that an increase in diameter might have an influence on the speed of the vehicle (racer) merits little consideration, as at racing speeds the air resistance is so much greater than resistance to rolling motion. This leads us to the subject of the new type of wheels designed to diminish the air resistance.

DISK WHEELS.

Disk wheels or pressed steel wheels are in reality not a novelty, but may be considered a development of the anti-dust vehicles introduced on railways a number of years ago by the same manufacturer who now builds them for automobiles. These wheels consist essentially of two pressed steel disks of suitable thickness and in the form of rather flat truncated cones. The two inner edges receive the hub and the two outer edges the rim. These wheels present the advantage of not churning the air like the spokes of ordinary wheels, and the air resistance is thereby probably considerably reduced. No direct experimental results are available regarding the saving in power thus effected, but experiments made in power stations have shown that as much as 5 per cent. in fuel can be saved in certain cases by encasing an engine flywheel with sheet metal, making it a closed cylinder,

thus preventing the spokes from acting as fan blades.

It is almost impossible to experimentally determine the actual saving in power by the use of disk wheels, over spoked wheels; but it is certain that it is so small that in touring vehicles it would be of no consequence. However, this type of wheel is of very considerable interest when the point of strength is considered. As was remarked by M. Lefer at the Denaturated Alcohol Congress, disk wheels, owing to their construction, form a solid unit—that is to say, the rim, hub and spokes are solidly and unalterably connected among each other. A wheel of pressed steel, well made of suitable material, does not break under shock; it may bulge, twist or bend, but it is never forced through in the centre, and it offers a greater guarantee of returning to the garage than any other wheel, particularly because its deformations absorb a very large part of the vis viva of the shock and thereby reduce the destructive effects on the other parts of the car—axles, springs, frame and motor.

If we examine in detail a disk wheel built for racing automobiles (Serpollet racer in the mile race at Nice of 1903), we notice that it is essentially composed of two very flat truncated cones of nickel steel sheet (3 per cent. elongation), .08 inch thick. The central flanges of the pressed steel disks receive the hub, and the outer flanges are riveted to a Michelin rim and a sort of false wood rim which maintains the spacing between the outer edges of the disks, in order to provide room for the passage of the valve and the lug bolts. A wheel thus built up presents the aspect of a steel wire wheel the spokes of which have been covered over with sheet metal. The disks are, moreover, provided with four holes, with movable covers, to give access to the valve and the lug bolts. It is to be expected that this type of wheel will eventually be used for ordinary vehicles shod with pneumatic tires, and for the cabs in use in Paris, which ought to be provided with wheels less likely to collapse in collision than suspension wire wheels.

ELASTIC WHEELS.

Although it is impossible for spring wheels without pneumatic tires to possess the same elasticity as ordinary pneumatically tired wheels, if it is possible to use these wheels on racing cars, there certainly should be nothing in the way of their use for touring cars running at moderate speed, and the elasticity of the wheels would no doubt prevent a good portion of tire troubles. The experiments made in this direction are therefore of considerable interest.

The Roussel elastic wheel comprises an ordinary hub and a rigid rim, with solid rubber tire; the spokes are replaced by steel springs. Each of these springs presents very nearly the form of a split cylindrical ring the ends of which have been sprung sideways and the split ring thus transformed into a helical spiral, which

seems to have been cut from a helical spring made from a wide steel ribbon.

The middle part of the ring is fixed to the rim by a yoke or cleat which holds it under tension; the ring is further secured by two bolts, around which its two ends are wound. The two sets of spring bolts form two separate crowns, almost touching each other, which gives the assemblage of the elastic circular spokes a quite large base (more than twice the width of the springs). This gives the wheel the necessary transverse strength, which, as we pointed out before, is generally wanting in spring wheels, although it is absolutely indispensable.

The indeformable rim rolls on the ground in the ordinary manner, and the blows and shocks which it receives can only be transmitted to the hub through the flexible spokes, and are, therefore, greatly attenuated, almost to the same extent as if the wheel was shod with a pneumatic tire.

FLEXIBLE DRIVING WHEELS.

The method of driving a wheel of this type necessarily differs from that employed with rigid wheels, as it is impossible to apply the power to the flexible spokes. For this reason the manufacturer mounts the driving sprocket on the hub and connects it to the rim through a set of coiled springs. This method affords the advantage of a gradual start, which insures greater efficiency and saves the flexible spokes from sudden strains, for which they are not built. In case one of the spring spokes breaks it is rapidly replaced by taking out four bolts—two at the hub and two at the rim.

The experience gained with wheels of this type is not yet wide enough to permit of drawing definite conclusions, but it does not seem unfavorable to the elastic type of wheel. A Serpillet car, for instance, capable of a speed of 36 miles an hour, has been running for several months with such spring wheels, with very satisfactory results. A Bardon vehicle, fitted with similar wheels, recently completed a trip from Paris to Madrid.

The suspension of these vehicles, although it cannot compare with the smoothness of those mounted on pneumatics, is quite satisfactory, even on cobblestone pavements. Curves are taken without difficulty, and no trouble is met with as regards the steering, although a slight amount of play seems to exist, the same as when the tires are not fully inflated. Under these conditions it is possible that spring wheels, while inferior to pneumatics, from the standpoint of elasticity, may yet become of real advantage, especially for vehicles which do not run much above the legal speed. But as stated, it is necessary that they should first receive the sanction of practice by prolonged use. Besides, it is desirable that information should be gathered regarding their cost of up keep.

LESSONS OF 'THE ROAD'

In a Runabout to the Stewarttown Pike in Southwest Pennsylvania.

By E. P. HODGES.

Our last excursion into the rugged wilds of the Cheat Mountains (as reported in THE HORSELESS AGE) was so fraught with enjoyment that my wife and I resolved to try the Stewarttown pike, which common report described as excellent for runabouts of low power, as the hills were gently undulating and the yellow clay well packed down. We removed the dos-à-dos seat, and after bidding goodbye to the infant and his Mexican attendant, started out of our farmyard driveway and turned to the left up a branch road which left the river a mile beyond our home and turned into the foothills upon the summit of which was the clay pike in question.

Our first grade was about as steep as a two horse wagon and good animals could surmount, but only 30 yards long. We attacked it, speeding up the engine and engaging our low speed clutch. We climbed 15 feet and the engine sighed wearily and stopped. The differential band brake was practically useless, as usual, and I avoided a race down hill by engaging both brake and clutch, while my better half placed a large boulder under the driving wheel. By dint of speeding up and a plentiful "stoning" of the road we reached a level place and moved on rapidly.

Turning from the river bottom we bumped up a pretty stiff grade on a road which might better be designated as a continuous stone pile. A farmer passed in a buckboard, his yellow wisp of chin whisker waving in the breeze. His horse remained perfectly calm, except for a moment. "Why are these roads not kept in some state of repair?" I asked him. "Wall," replied he, "we works out our taxes on 'em, and the fellers hain't struck on the job and jist throws in dirt instead of stone. The first rain washes it all out, and there ye air."

Saddened but determined, we started up again, and withal enjoyed the exquisite scenery. The road wound for half a mile through an umbrageous wood of chestnuts, oaks and beeches. Not a house was to be seen. Here and there a group of contented cows grazed by a cold brook side. The summit of the peak chain of hills was reached in half an hour, but we found our water tank almost empty and the water steaming merrily. A welcome lull water trough by the roadside soon bore in sight, where we stopped to examine things mechanical and replenish our water supply. The strainer funnel which I always carry was a great boon, for wood

fibre dregs in hose pipes are not conducive to circulation.

I forgot to say that before starting I had carefully wrapped the 2½ inch tires in sackings and rags. These had saved us from stone punctures, but were now a sight to behold, waving about like signals of distress. We took them as such, and I laboriously removed them as the longed for pike was before us. As we moved on, a black pouring cloud obscured the sun, which until now had been very ardent. Rainstorms here come up very quickly from the southwest, so we were not surprised to feel the preliminary gusts of wind and large rain drops.

On we kept, running at high speed on the gentle slopes. Oh, the indescribable delight of moving and gliding rapidly along in a good motor car! It must be akin to flying. We soon came to a long, steep hill, and as the rain had wet the upper layer of dusty clay our wheels became heavily clogged with paste mud and slipped on the road surface. I dismounted and resignedly placed stones under the wheels, while my wife, now wet and cold, adjourned to a small wayside farmhouse. I stayed outside and took my just deserts like a man, watching for a lull in the storm to attack the hill once more. The rain soon ceased, and the sun and wind dried the road enough to allow me to get up successfully. A long stretch of good undulating road was ahead of us, leading through Stewarttown. As we passed through the short and only street of the small, sleepy village, several horses tied to fence pickets displayed their various accomplishments and did their best to flee into the neighboring wilderness. However, I stopped or slowed the car as I deemed best, and in dulcet tones abjured the chargers to "whoa." Whether my voice was soothing or not, they generally seemed to listen and be comforted.

As we passed out of Stewarttown the lowering clouds promised more wetness, so I said to my companion: "Let us speed up and see what this car can do." We threw in the high speed on a slight down grade, advanced the spark and "let her go." For five minutes we went, and then I felt a warning wobble of the front wheels. I realized quick as thought that something was wrong, and applied the brake and the band on the low speed. Before I could think again the car, its speed slightly checked, turned into the roadside, the front wheels "dished under," and my wife and I, not parted in accident, soared on the dashboard like two angels, alighting on the road head first. As I am accustomed to acrobatic movements, I came down upon my extended hands, shaken but unhurt. I turned to see if the car was going to add its 1,000 pounds weight on top of us, but it remained stationary, right side up (without care). Mrs. H. lay groaning on the road, and with difficulty arose to her feet. I ran back to a nearby house and got her a little

stimulant. She had no bones broken, so awaited me in the farmhouse while I fortunately espied a horse plowing in a field, and for 50 cents engaged it and its attendant to haul me into Mr. B.'s barn, where we were accorded every attention. Even the chickens seemed to admire the machine and at once began to roost on the piano box woodwork, which, as you know, has thirteen coats of costly varnish, etc. Mr. Baer was an American farmer, tall, and with a fierce, jet black moustache. We were now in West Virginia, and we received here that far famed, wholesome hospitality for which this State is noted. Declining kind invitations to dinner, etc., we hired a "hack" from another farmer and drove into Point Marion three hours later in a depressing rainstorm.

The doctor pronounced my companion's injuries as not dangerous—simple sprains or bruises—but they were enough to deter her from "motoring" for some time to come. The cause of the accident was that the steering arm on the left side steering knuckle had broken off and become separated from the steering lever arm. In other words, the wheels steered themselves, while the lever in my hand was useless. By the way, the steering cones on such runabouts are too thin and weak for such responsible work.

The new knuckles came from the factory in a week, and I drove out by hay motor to make repairs. The good farmer, the schoolmaster and the Methodist preacher all helped me to disconnect the necessary parts, these gentlemen being of a mechanical turn of mind and having had some experience in locomotive shops. The village blacksmith, with leather apron and swelling biceps, also ventured a willing hand. We found that the great shock had torn apart all the hose pipe connections. Otherwise, aside from a broken steering lever and the crystallized steering cone, we were in fair shape. We renewed the broken parts and also put in a new steering lever, and I was pleased to find the motor running as well as ever. Bidding goodbye to my corps of kind assistants, I bowled along over the dry road, reaching home safely, but with the caution gained by sad experience.

I had scarcely pulled up before my house when the crank case lugs at the bearing broke off and dropped out. As the valves needed grinding and a general overhauling of the car was necessary, I sent it to the shop in Pittsburgh.

The Automobile in the Practice of a Chicago Physician.

By D. BIRKOFF, M. D.

The automobile fever took a firm hold of me in the early part of April, 1902. I took a trip to the different sales establishments here, but concluded that the machinery was too intricate and difficult for me to completely master. I kept using

my horse (kept two until then) until he ran away with my coupé, which he smashed against a beer wagon so completely that the débris was sold for \$45. The fever then came back with irresistible force and could not be subdued. So, consulting with some automobile friends and looking over the different makes, I decided to buy a single cylinder machine weighing about 1,150 pounds.

I took a drive of one hour with the agent, and was then turned adrift to seek and work out my own salvation with the machine. This was a tremendous mistake, as I was absolutely ignorant about the machine, except turning the crank and turning on the gasoline.

Having had the machine a couple of days, I was asked by a medical brother to take him to his home, to which proposition I proudly consented. Soon after the start we came upon a very muddy road, and having the clutch too loose the machine refused to advance. I then stopped the machine to tighten the clutch, but being somewhat nervous and annoyed, I turned the hand wheel which opens and shuts the needle valve on this machine too far backward, so that the screw slipped, which gave me an over-supply of gasoline. On starting the machine it would explode once or twice and then give up the ghost. I worked and fussed and perspired for an hour, turning the crank and trying to locate the difficulty.

The doctor meanwhile turned all his wit on me and the machine, and for that period became a contemptible humorist. A machine having rarely been seen in that neighborhood, I soon had an audience that astounded and irritated me, and when their wit was added to the doctor's the situation became intolerable. The starch had meanwhile all been taken out of my collar and my arm almost paralyzed, so I concluded to accept with all humility this painful situation and have an expressman tow me to my residence.

It was dark when we reached our destination, with the pride all crushed out of me and feeling that I had bought an elephant too intricate for me to manage and understand. However, "Hope springs eternal in the human breast," so I was up bright and early next morning to tackle the problem and soon located the difficulty.

A few days after that, as I was speeding along, I heard unusual explosions in the rear part of the machine and noticed a loss of power, so that the machine came to a stop. It occurred on a busy street, and the inevitable crowd was soon at hand. Perspiration and hard work did not locate the trouble. At this stage a brother practitioner who had purchased the same make about the same time I had bought mine happened to come along and kindly volunteered his assistance. I soon found that his stock of practical knowledge was easily exhausted, and so concluded to test the ability of a bicycle

repairer who lived close at hand. He spoke learnedly about the different parts of the machine and acted as though he had knowledge to spare, and concluded after a critical examination that the batteries were exhausted.

Having an extra battery at hand, we attached it, but it did not solve the problem. Considering him a quack whose pretensions were far ahead of his actual knowledge, I paid and dismissed him. After two hours' work and with the assistance of my friend we at last arrived at home with the machine. I immediately sent for an expert, who found that the key holding the inlet valve had slipped out, and this had caused all the trouble.

These two experiences in about ten days convinced me that if I ever was to like an automobile and derive benefit from it in my practice I must study and thoroughly understand every part of the machine, so that slight troubles, like the ones I experienced, could be rectified immediately on the spot.

After having the machine a little over two weeks I concluded to visit my brother, who lived in a suburb to miles from my home. Feeling somewhat competent to run the machine (as I thought) I took Mrs. B. and two children along, and had an experience then which will stay with me till my last hour. I was going along Michigan avenue at a 15 mile gait when a horse and buggy came from the opposite direction, steering for the curb on my side. I turned out to let the horse driver have my side, but when he was about 40 feet from us he suddenly turned to the other side, to which I was going. As my course was in the same direction and a collision seemed inevitable, I sharply turned my machine, with the result that it tipped over as though struck by a cyclone.

Luckily the top on my machine was up, which prevented an absolute turn over. The first question Mrs. B. asked me when I was down on the street was: "How is my eye; is it out or destroyed?" I looked at it and saw blood in it and around it, but fortunately it came from a slight cut above the eyelid. The children were not injured nor myself. The top that served such a good purpose was a sad wreck. The machine was not injured at all.

I pushed the machine into a garage and went home, a sadder and more experienced man. The man with the horse and buggy gave the whip to his horse and left us to our fate. This man was either drunk or wanted his horse to become acquainted with the machine, in the manner I have since seen many drivers do, and to whom I now pay not the slightest attention. I should have put on the brake and closed the throttle or released the clutch. My machine is steered by a side lever, and I did not know that turning sharply could tip that machine over.

This occurrence also left a profound impression on my mind, so that now absolute safety and not speed is the motto.

In two weeks I learned that I must study my machine thoroughly if I did not want to become the laughing stock of my friends and neighbors, and also to drive with care if I did not want my life insurance to be collected.

The first break that occurred on my machine was when I had used it about four months, when it developed a loud knocking in the engine and I knew something was wrong. At the repair shop they found that the outer shell of the wristpin was broken, so that a new wristpin was required, and I had it put in. In packing the head, however, they did not make it water tight, so that I took the machine to another repair shop to improve on this part of the job. However, I fell from the frying pan into the fire, as these men packed it four times in three weeks and then it still leaked.

I appealed to the manufacturers, who gave me minute instructions, and I saw to it that their suggestions were carried out, and I had no more trouble. This packing cost me at least \$25. It makes me hot under the collar now to think of it.

The new wristpin broke about six months after; it was again the outer shell, and I heard a knock whenever I was running at good speed on good pavement. My experience with the repair men this time should be instructive to novice automobilists—and may they profit by it. I went to an expert in a large repair establishment located here, and he diagnosed the trouble as a worn out transmission gear. This not being satisfactory to me, I went to another repair shop and had everything removed and looked at. There I was told that the worm gear was worn out. Both repair men were positive and obstinate in their opinion. My brother practitioner, who had the same make of vehicle, had by this time developed into an expert mechanic, and could give pointers to many a so called expert. We concluded that the outside piece of the crosspin of the piston head was broken, and having the courage of our conviction, had the head pulled off (which made me shiver), and found the trouble where we expected it. I then had a solid piece of steel put in, which I think will outlast the machine.

An automobilist should be able to diagnose his own troubles and not give himself over, body and soul, to the repair man, unless he wants to enter into bankruptcy, or at least get so disgusted at the expenses that as a last resort he sells his machine. Go to the shop and tell them what to do, and see to it that it is done properly, else you will often find when the car is returned that some other part is not in working order. Some repairs have a trick of saying: "Am now too busy to fix the machine; I will do it this afternoon or tomorrow." Whenever I had to submit to this, or had no time to stay, I was always overcharged; of this I am positive.

I have used the machine from June, 1902, till now, except about six weeks last winter, making on an average about 40 miles a day, with very little breakage or need for repairs. The tires, however, have been a great source of expense and inconvenience. The tire question is a tremendous problem, and upon it, I think, the future of the automobile depends. I have almost decided to put on solid rubber tires, to prevent the expense and trouble of punctures, etc. In fourteen months' use, having traveled, I think, 15,000 miles, I have broken two wristpins and one brake band; that is about all. I have put on a new chain and four cones, otherwise the machine has stood up beautifully and seems as good as when I bought it.

In regard to the manufacturers, I can say that they have always been extremely courteous, quick to reply to letters and moderate in their charges, and that they spared no trouble to give me pointers and advice in my "training period." I would recommend to all prospective buyers to purchase a well known make and one manufactured near their home, as it is very convenient in getting parts and advice.

For a year I have not been towed home, and I have gone as far as 20 miles in the country with my family with a dos-a-dos, and have always brought them home on time. I take part of my family two or three times a week for a spin during mild or hot weather, and have had no trouble of any kind after my first disaster. My practice is quite extensive and covers a large territory, and I am positive 40 miles a day on an average is not an exaggeration. I have my difficulties sometimes with parts out of adjustment, but I never get floored, and always get to my destination, generally in quick time.

I take care of my machine personally, and enjoy it. It is a relaxation to me, and I have the satisfaction of knowing that all parts are oiled and in proper condition. A man who does not care to be an expert about the mechanism of his machine, who does not oil all parts well, and does not give the car close personal supervision may eventually become disgusted and sell his machine.

My expenses have been between \$16 and \$18 a month, all told, and the main items, or nearly the entire expense, have been tires, gasoline and batteries. I have done all my professional work (except sometimes at night), have given my family innumerable rides, and have enjoyed myself far more than driving the best horse I ever had. Two horses in the livery stable would cost \$36 a month; shoeing \$6 more, and repairs on harness and buggies would surely bring the total to a yearly expenditure of \$600, not including loss of horses. I think my machine will stand many years' wear, if judiciously used and worn out parts are occasionally replaced. My experience with my machine may be an exception, but it is the truth as I have related

it in this article. My Chicago automobile friends can substantiate the fact that my automobile is seen as regularly in front of my office, rain or shine, as my horse ever was in the days gone by.

The Operating Principles of Four Cycle Gasoline Motors.

Gasoline vapor and air mixed in suitable proportions form a combustible mixture or explosive mixture (an explosion is simply rapid combustion). If such a mixture is ignited in a closed vessel the combustion not only generates a great deal of heat but multiplies the pressure within the vessel several fold. If the explosion took place behind a movable piston in a cylinder the increase of pressure would drive the piston outwardly, and if the piston was suitably connected with a crank shaft rotary motion could be obtained from the explosion or combustion in the cylinder. In order that power may be derived continuously in this manner it is necessary that the cylinder be provided with valves for admitting the charge of explosive mixture and for exhausting the burnt gases, and with an igniter to fire the charge at the proper moment. In addition, as the process of power generation in the cylinder is intermittent—successive periods of combustion and expansion being separated by periods of exhaust and admission of a new charge—a flywheel is required to maintain the motion of the crank shaft during this intermediate period.

A gasoline engine therefore consists of the following essential parts: A cylinder in which a charge of gaseous mixture may be burned; a piston in that cylinder on which the pressure produced by the combustion may act; a crank shaft for transforming the rectilinear motion of the piston into rotary motion; a connecting rod for connecting the piston to the crank; an inlet valve for admitting the charge to the cylinder; an exhaust valve for exhausting the burnt gases after expansion; an igniter for firing the charge; mechanism for operating the valves and igniter from the crank shaft and a flywheel to insure fairly uniform motion of the crank shaft in spite of great variations in the pressure on the piston.

A single repetition of all the different operations in the cylinder—suction, compression, expansion and exhaust—is called a cycle. In the so called four cycle type of engine (which is at present almost exclusively used for automobiles) these operations are distributed over four piston strokes or two revolutions of the crank shaft, and for this reason this type of engine is sometimes called a four stroke cycle engine. The various operations in the cylinder follow each other in the following manner, with relation to the motion of the piston: When the cycle begins the piston is in its innermost position or near the closed end of the cylinder. During the outward stroke the suction created

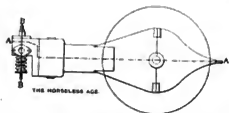


FIG. 1—SIDE VIEW OF HORIZONTAL FOUR CYCLE ENGINE.

by the motion of the piston draws a charge into the cylinder (suction stroke). During the next return stroke this charge is compressed to one-third or one-fourth its original volume (compression stroke). At the end of this stroke the compressed charge is ignited, and during the next outward stroke of the piston it burns and expands (expansion or power stroke). During the next return stroke the burnt gases or products of combustion are discharged from the cylinder through the exhaust valve (exhaust stroke)—and then the cycle begins anew.

The various essential parts of a gasoline motor may be arranged in different ways relatively to each other, the cylinders may be arranged either vertically or horizontally, and one or more cylinders may be used in a motor, but it is the intention to more closely describe here the single cylinder horizontal type of engine used on a considerable number of American makes of runabouts.

Fig. 1 herewith is a side view of this type of engine, and each of the figures 3 to 6, inclusive, shows two sectional views of the engine, the upper view being a section on the line A A in Fig. 1 and the lower view a section on line B B in Fig. 1. The cycle of the engine may be represented by a circle as in Fig. 2, each quadrant of the circle representing one piston stroke or one operation in the cylinder. In the figures 3 to 6, inclusive, are represented the successive operations in the cylinder, and in Fig. 2 are indicated the various points on the cycle of operations represented by Figs. 3, 4, 5 and 6 respectively.

The structural part of the engine consists of the engine cylinder, the cylinder head bolted to the cylinder at the rear end and the

crank chamber secured to it at the forward end. In the present case the crank chamber is shown as composed of two parts joined in a vertical plane, one part being cast integral with the cylinder and the other part bolted to the former. As the temperature within the cylinder during the power stroke attains a value higher than the melting point of cast iron (of which the cylinder is made) the cylinder and head are generally surrounded by a water jacket to prevent their inner surface being burnt by the heat, etc. The piston consists of a hollow cast iron cylinder open at one end. It is necessary for the piston to make an air tight joint with the cylinder walls, and to this end three or more grooves are cut into the outer surface of the piston near the closed end and split cast iron "piston rings" fitted into these grooves. These rings are cut slightly larger in diameter than the piston and are split, sprung together and forced into the cylinder so their spring action causes them to bear tightly against the inner wall of the cylinder. The connecting rod is a rod of steel or bronze, with a bearing at either end, the bearing at the rear end surrounding the "piston pin" which passes transversely through the piston at about the middle of the length thereof (Fig. 4), and the other bearing surrounding the crank pin. The crank shaft has bearings in the side walls of the crank chamber. As the crank revolves the piston moves back and forth in the cylinder, but when in its most rearward position is still a considerable distance from the cylinder head, the space between the cylinder head and piston head when the piston is in that position being called the compression space. The limit of the backward motion of the piston is indicated by the line A, Fig. 3.

The inlet and exhaust valves are of what is known as the poppet or mushroom type, which sufficiently characterizes their form. They have a conical seat and are held down to their seats by coiled springs of spring steel. The spaces above the valves communicate with the cylinder through the inlet port and exhaust port respectively. The space below the inlet valve communicates, through the inlet passage, with the "carburetor" in which the gaseous mixture is formed. The space below the exhaust valve communicates through the exhaust pipe with the muffler, which in turn communicates with the atmosphere. When the valves are lifted from their seats the spaces above and below them are brought into communication with each other, and hence when the inlet valve is lifted the cylinder is in communication with the carburetor, and when the exhaust valve is lifted the cylinder is open to the atmosphere through the muffler.

The valves are opened and closed at the proper moment by what is known as the valve gear, comprising in this case a pair of helical gears, a "cam shaft" running parallel with the cylinder and driven by the "cam shaft gears" from the crank

shaft; a pair of cams on the cam shaft for the two valves respectively, and a pair of levers by which the cams impart motion to the valves. The cam shaft gears are helical gears, a form of gearing for transmitting motion from one shaft to another not in the same plane. The gear on the cam shaft has twice the number of teeth as the gear on the crank shaft, and hence the cam shaft makes only one revolution for every two of the crank shaft; in other words one revolution for every cycle of the engine.

Near the rear end of the cam shaft are secured to it two cams, one for operating the inlet valve and one for operating the exhaust valve. These cams consist of cylindrical steel blocks, with a projection on their cylindrical surface, and their object is to transform the rotary motion of the cam shaft into the intermittent rectilinear motion of the valves. This is accomplished by the aid of the valve levers with their cam rollers.

Referring now to Fig. 3—the piston is seen to have just started on the suction stroke. The crank is supposed to be "turning over"—that is as the piston moves forward the crank pin first rises and then falls—as is the most common practice. The inlet valve cam has just raised the inlet valve from its seat and explosive mixture is streaming into the cylinder through the open valve, as indicated by the arrow. When the piston reaches the limit of its forward travel the inlet valve cam has passed the cam roller and the inlet valve is closed by its spring.

In Fig. 4 the various moving parts are shown in the position they occupy when the next return stroke (compression stroke) has been about half completed. During this stroke both valves are closed and the mixture is compressed to about one-quarter its original volume, preparatory to firing it. That is to say it is compressed into the clearance space back of the piston when the latter is in its most rearward position. The object of compressing the charge before firing it is to increase both the power of a motor and its fuel economy.

In Fig. 5 the parts are shown in the position they occupy shortly after the beginning of the third or power stroke. About the time of the beginning of this stroke a cam near the forward end of the cam shaft has established metallic contact with an insulated steel spring, thereby closing an electric circuit and producing an electric spark at the spark points of the plug which is screwed into the cover over the intake valve (as shown). The spark ignites the mixture, and immediately the pressure in the cylinder is greatly augmented and the piston is driven outwardly with great force. To give an idea of the forces in play—the pressure immediately before ignition, the compression pressure, may be 70 pounds per square inch, and the pressure immediately after ignition may be over 200 pounds per square inch. During the

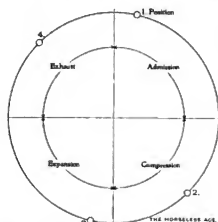


FIG. 2—GRAPHICAL REPRESENTATION OF CYCLE.

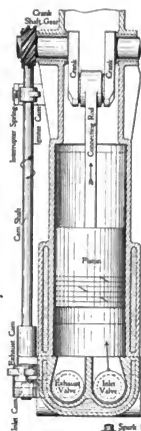


FIG. 3—FIRST OR SUCTION STROKE.

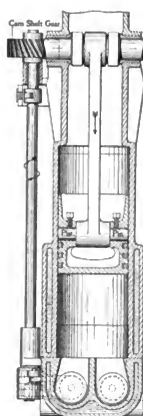


FIG. 4—SECOND OR COMPRESSION STROKE.

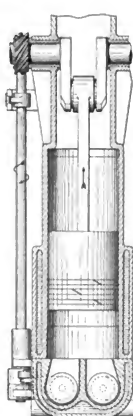


FIG. 5—THIRD OR POWER STROKE.

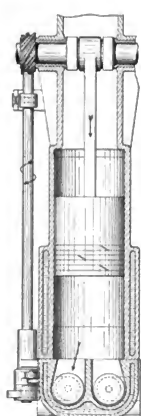


FIG. 6—FOURTH OR EXHAUST STROKE.

power stroke, or expansion stroke, all valves remain closed. The energy liberated by the combustion of the gasoline vapor by forcing the piston outwardly is converted partially into mechanical work, and when the piston has reached the end of the stroke the pressure in the cylinder has fallen to perhaps 50 or 60 pounds per square inch. Then the exhaust valve is opened and during the next return stroke the burnt gases are forced out of the cylinder through the exhaust pipe and muffler and are discharged to the atmosphere. In Fig. 6 the moving parts are shown in the position they occupy when the exhaust stroke is about half completed. At the completion of the exhaust stroke the exhaust valve closes and the motor is then ready to suck in a new charge and commence the cycle over again. In regular operation the whole cycle is completed in perhaps one-quarter of a second or less.

It will be noticed that power is produced in the cylinder during one stroke only out of four, and in order that the engine may run fairly steadily a large flywheel is nec-

essary, which is keyed to the engine crank shaft, generally at the opposite side from the cam gear. During the expansion stroke the flywheel is speeded up and absorbs energy, and during the other three strokes it slows down and returns the absorbed power.

The technical committee of the German Automobile Club has adopted the following formula for the power of gasoline motors:

$$H. P. = \frac{1}{4} \times \frac{W n d^2 p n s}{4 \times 75 \times 30'}$$

per cylinder. In this formula n represents the normal revolutions per minute, d the piston diameter in centimetres, s the piston stroke in a fraction of a metre, W the efficiency, p the mean pressure in kilograms per square centimetre. The horse power is equal to 75 kilogram metres per second. In the case of protests in races, etc., the following formula will be used, derived from the above:

$$H. P. = 3.2 d^2 n. s.$$

Automobile Omnibuses in Baden.

United States Consul Joseph I. Brittain writes from Kehl, Germany, that the historic old "bus," which for ages has done service carrying passengers and the mails between various towns in this section of Baden, where the steam railroads do not touch, is giving way to large automobiles, which travel much quicker and are much more comfortable. An automobile line is about to be established between the city of Kehl and the town of Rheinbischopsheim, a distance of 10 miles. The automobile will accommodate twenty persons, in addition to space for the baggage and mails. The round trip will cost 17 cents, or 10 cents for one way. Several trips will be made each day. The automobile is the property of the towns of Rheinbischopsheim and Bodersweiler, and was purchased at a cost of \$3,332. The towns pay all running expenses and divide the profits. An additional sum is paid by the various towns along the line for the privilege of having the mails carried.

NEW VEHICLES AND PARTS.

Thomas American Light Roadster —Model No. 22.

Following is a specification of this car, the chassis of which is shown in the illustration herewith:

Triple cylinder, vertical 24 brake horse power motor, mounted under front hood.



CHASSIS OF THOMAS ROADSTER, No. 22.

equipped with chain oilers on outer bearings. Sliding gear transmission, three forward speeds and reverse, direct drive on high speed. Entire gearing, including differential, enclosed and running in oil bath. All outer bearings fitted with chain oilers. Locking device in connection with transmission makes it impossible for clutch to engage motor until gears are perfectly in mesh. Eighty-four inch wheel base; 56½ inch gauge; detachable link roller chains, one to each rear wheel. Roller bearings (dust proof) on all wheels and countershaft. Electric switch, vibrator coils and oiler (force feed and visible sight feed), all

yokes and knuckles. Detachable tires; make optional. One foot brake on differential shaft, two on drums attached to rear wheels. All brakes can be applied at once by throwing emergency lever. The application of either hand or foot lever disengages clutch. Transmission of power to rear wheels is by two chains, each pulling inside the line of roller bearings of each wheel. Metal body, new design, improved King of the Belgians type tonneau, very roomy, high back seats, wide door. Automobile red finish; option, green. Worm and gear type steering device, adjustable both in steering post and sector, all enclosed.

The Crandall Mechanical Lubricator.

A multiple lubricator for automobiles, made with any number of feeds desired, has been brought out by the National Sewing Machine Company, of Belvidere, Ill. The lubricator consists of the following parts: An oil tank for carrying the supply of oil; a pressure tank with sight feeds and shut-off valves; a piston pump for pumping the oil from the oil tank to the pressure tank; a bypass from the pressure tank back to the oil tank, with a throttling valve for adjusting the pressure acting on the feeds; a check valve in each of the oil feed tubes.

The oil supply tank is of prismatic shape and may be placed anywhere on the car. The filling opening is provided with a readily removable screen for preventing any solid particles getting into the tank, which might clog up the small oil tubes. Another screen is placed at the outlet of the supply tank.

Figs. 1 and 2 herewith show a front elevation and sectional elevation, respectively, of the pressure tank, with its sight feeds and valves. Into the pressure tank A lead two pipes B, one of which is located directly behind the other in the sectional view, so only one can be seen. Through one of these pipes the oil arrives from the pump and through the other the surplus is bypassed back to the supply tank. There are also two outlets from the pressure tank to each of the sight feeds C, one leading from near the bottom of the tank and being controlled by the valve D, and the other through the vertical pipe E and controlled by the valve F. From the top of the sight feeds the oil flows through small pipes G, first horizontally through the pressure tank and dashboard (if the pressure tank is fastened to the latter) and then downward to the places to be lubricated.

The method of operation is as follows: When the lubricator is to be put in use the pressure tank is first filled with water or glycerine through the screw cap H, to a height even with the top of the sight

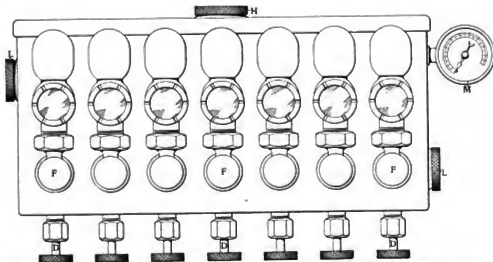


FIG. 1—FRONT ELEVATION.

CRANDALL MECHANICAL LUBRICATOR.

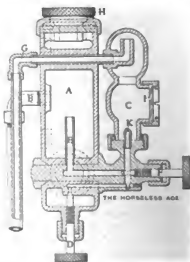


FIG. 2—SECTIONAL ELEVATION.

feeds. The valves D are then opened and the pump started, thereby pumping oil into the upper part of the pressure reservoir and forcing the water or glycerine through the valves D into the sight feeds. This is continued until the sight feeds are filled to the top of the glass I. The level of the water or glycerine has then sunk below the top of the small tubes E in the pressure pipe. The valves D are now closed and the valves F opened, which, if the pump continues to run, permits the oil from the top of the pressure reservoir to flow downward through the vertical pipes or tubes E and through the valves F into the sight feeds, and as oil is lighter than water or glycerine, as the oil drops become detached from the nozzle K they can be seen rising in the water through the glass I. The upper chamber of the sight feed casting is always filled with oil, and from there it flows through a small tube to the bearing to be supplied.

The pressure chamber is provided with a glass L at each end, which admit of readily ascertaining the amount of water or glycerine in the tank; it is also fitted with a pressure gauge M constantly indicating the pressure at which the oil is fed. The rate of feed can be varied for all feeds simultaneously by adjusting the throttle valve in the bypass pipe, the adjustment of which determines the pressure of the feed; it can also be adjusted separately for each feed by means of the particular oil valve F. It is claimed that after the oil valves have once been properly adjusted they need never be touched. The pressure valve may conveniently be located on the dashboard beside the pressure tank. In each oil pipe, near the bearing to which it supplies lubricant, is placed a small check valve. The function of these valves is to hold all the connections and tubing full of oil while the engine is idle, so as to insure prompt resumption of the oil flow when the engine is restarted.

The oil pump (Fig. 3) is an ordinary piston pump similar to those used on steam



THE MACKLE-THOMPSON RUNABOUT AND CHASSIS.

carriages for feeding the boiler. It is driven by a crank pin working in a transverse slot in an extension of the pump plunger. The pump is quite large for the work it is called upon to do and substantially constructed.

Improvements in the 1904 Orient Buckboard.

According to an advance circular of next year's model of the Orient buckboard, a considerable number of improvements have been made. Most important of these is undoubtedly the provision of a two speed gear, which increases the hill climbing power and makes a slower speed in crowded thoroughfares possible. The drive gear is now laminated with fibre and the muffler has been improved, which renders the machine more noiseless. Instead of the rigid support in the rear a spring support is now used, in connection with full elliptic springs in front. A spring cushion has been added to the back seat and the seat made wider. The motor is started by crank in the usual manner, instead of with a strap starting device. The hickory reaches are made heavier, and the platform is 2 inches higher from the ground. Goodrich single tube traction tires are used. The maximum speed of the machine is said to be 30 miles per hour. The total length is 106 inches and the total width 48 inches. The weight is about 500 pounds.

We learn it is intended to build these machines in large numbers.

The Mackle-Thompson Gasoline Runabout.

The Mackle-Thompson Automobile Company, of Elizabeth, N. J., are manufacturing a light runabout driven by a 5 horse power air cooled motor, placed in front under a bonnet. The running gear frame is constructed of a single piece of angle iron, and is supported by three-quarter elliptic springs both in front and rear, doing away with all reaches. The wheels are of the artillery type, 30 inches in diameter and fitted with 2½ inch tires. The ignition current is furnished by a dynamo, and no battery is required. One filling of the gasoline tank is claimed to last for a run of 200 miles. The transmission gear is of the individual clutch type, and gives three forward speeds and one reverse, all gears running in oil. The transmission to the rear axle is by bevel gears and a shaft with universal joints. The differential gear on the rear axle is of the spur gear type, and is entirely enclosed and runs in oil. The car weighs 650 pounds complete, and is equipped with wheel steering. It is claimed to have a maximum speed of 35 miles per hour.

The 1904 Brennan Motor and Transmission.

The 1904 product of the Brennan Manufacturing Company, Syracuse, N. Y., will comprise three standard gasoline motors of 8, 12 and 14 horse power respectively, with corresponding transmission gears of the



FIG. 3.—OIL PUMP.



1904 MODEL ORIENT BUCKBOARD.

sliding gear type. The cuts herewith illustrate the general arrangement of these combinations.

The engines are of the double cylinder opposed type, with double throw cranks, and cylinders made of semi-steel. The valve chambers and cylinder heads are cast inte-

The crank shaft is hand forged from open hearth steel of .3 per cent. carbon, and the cranks are cut from the solid block. The cam shaft gears are made of forged steel and are enclosed within the crank case, where they are protected from dust and properly lubricated. The cam shaft has a

keys and a lock nut; it is 17½ inches in diameter, and weighs 75 pounds for the 8 horse power motor, 90 pounds for the 12 horse power motor and 100 pounds for the 14 horse power motor.

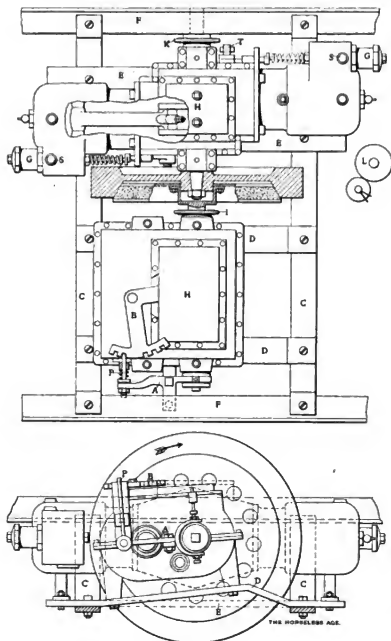
In the 1904 models the crank case has been redesigned, making it more convenient for mounting the motor; it is provided with a large hand hole cover on top for quick inspection and adjustment, and the top half of the case can be readily removed, giving access to all the enclosed parts and permitting of removing the crank shaft without disturbing the cylinders. Lubrication is by grease cups on the crank shaft bearings.

The motor speed can be varied from 130 to 1,300 revolutions per minute. The new Brennan carburetor, which is used with this engine, is claimed to throttle the engine under load so as to vary the speed of the car on the high gear from 4 to 30 miles per hour, and it is further claimed that the carburetor automatically controls the proportion of gasoline and air. Ignition is by jump spark, and the spark plugs are said to be so located that the points will not soot. The cooling water is circulated by a geared pump which passes 10 gallons per minute at normal engine speed. Five feet of radiating coil are recommended per horse power.

The 8 horse power motor weighs 200 pounds complete; the 12 horse power, 235 pounds, and the 14 horse power 250 pounds.

The transmission gears furnished with these motors give three forward speeds and one reverse. The highest speed is a direct drive and gives a reduction from the engine shaft to the rear axle of three to one; the intermediate speed corresponds to a reduction of six to one, and the low speed to twelve to one. A conical clutch is used, the cone being 14 inches in diameter and of 2 inch face, and an angle of 10°. The hub of the clutch cone centres over the hub of the flywheel, to insure continued perfect alignment. The large diameter of the clutch insures the power being transmitted easily, and without end thrust or slip. The end thrust is taken up by a special bearing between the flywheel hub and the crank case hub. The clutch is released by a bell crank A, which in turn automatically releases the pawl P from the quadrant on the bell crank B, preventing the operator from making changes of speed while the clutch is in engagement.

The sliding pinions are mounted on a square shaft made from hammered steel. The gears are made from forged steel and are case hardened. The gears of the No. 3 transmission are 7 pitch and those of the No. 4 gear are 6 pitch. The bell crank for operating the shifting gears does not project beyond the gear case, and hence does not make the transmission gear cumbersome. The gear is 12 inches wide, is fitted with a large inspection cover on top, and is partially filled with oil. The weight of the No. 3 transmission gear is 90 pounds. The gears are regularly fitted with a nine toothed sprocket of 1½ inch pitch and five-eighths inch width, for a roller chain. The sprocket may be located either in line with the centre



A, friction clutch operating lever; B, gear shifting bell crank; C, C, flat steel cross members of frame; D, D, flat steel strips supporting gear case; E, E, flat steel strips supporting engine; F, F, main angle steel frame bars; G, G, inlet valve housings; H, H, inspection hole covers; I, driving sprocket; K, pump driving sprocket; L, carburetor; P, pawl for interlocking clutch and change gear; S, S, spark plugs; T, ignition timer.

gral with the cylinders, and are completely water jacketed. The cylinder bores, pistons and rings are finished to gauge by grinding. The connecting rods are made of I beam pattern, of forged steel, with bronze bushed bearings, and are scraped to a fit on the journals. The crank pin bearing cap is secured by two studs, lock nut and cotter pin.

double bearing. The cams are made of high carbon steel and are hardened. The push rods are guided in a bronze bearing running the whole length of the rods. The foot piece of the push rod can be swung to one side for taking off the exhaust spring. The flywheel has a taper fit on the crank shaft and is secured to it by two

of the rear axle, or 1 inch to the right of the centre. The motors can be mounted either on the right or left hand side.

Certificate Awards in Endurance Run.

President Budlong, of the N. A. A. M., recently appointed a special committee, consisting of Henry Souther, William R. Innis and S. A. Miles, to examine the records of observers in the late endurance test between New York and Pittsburgh and determine to what award, if any, the contestants were entitled. The committee presented its report at a meeting of the executive committee on Wednesday last.

The committee found that from Thursday, October 8, to Saturday, October 10, inclusive, the road conditions were such as to completely annihilate the possibility of conducting the run upon the plan originally outlined in all of its details.

On account of the extraordinary conditions prevailing, the management was confronted at two stages of the journey with the suggestion that the test be discontinued, because it was believed by many that the physical strain upon the operators and observers was beyond endurance; the abandonment of the contest, however, might have been accepted by the public as an admission of weakness, and it was, therefore, continued with slight modifications of the rules, but as nearly as possible in accordance with the original intention. The committee therefore recommended that the highest possible credit be given those who did not fully comply with the rules, consistent with justice to those who finished the run without deviation from the rules.

The committee reported that on account of the condition of the observers' records, due to rain and mud, it had been found impossible to prepare a chronologically accurate report of the performances of the cars which failed to reach every garage on time. In one case, for instance, the observer's report had been swept away by the flood. In several cases observers left their cars, either through sickness due to the storm, or because convinced that the cars could not proceed; despite which, however, the operators delivered the cars safely in Pittsburgh. All of the belated cars arrived at one or more of the garages after the officials had departed, so that it was impossible to determine what allowance to make for rest; whether to consider their night stops as if official garages, or whether it would be proper to penalize a multiplicity of incidents over which the contestants had no control and which reflect no discredit upon the cars.

The executive committee considered the detailed statement made by the special committee at great length, and eventually agreed that nothing short of suspension of the rules could lead to a settlement. The rules were therefore suspended and it was decided to present a first class certificate

to the maker of each car which reached Pittsburgh, and gold medals to the maker of certain cars whose performances were especially meritorious. The list of gold medal winners will be issued after the December meeting of the executive committee.

Because of the incomplete records of stops, repairs and replacements, and the loss of records on which the association was dependent for information, it may be impossible to issue an official statement of these incidents. The records indicate, however, that the average cost of repairs and replacements was exceedingly low, being, in many cases, but a small fraction of 1 per cent. of the value of the cars. The examiner found that the cars arrived at Pittsburgh in better condition than had been thought possible even by the most optimistic.

The cars to which first class certificates will be issued are as follows:

Class A.—Rambler, No. 18, made by T. B. Jeffery & Co., Kenosha, Wis.; operated by Arthur Gardiner.

Class B.—Pierce Stanhope, No. 15, made by George N. Pierce Company, Buffalo, N. Y.; operated by Percy P. Pierce.

Class C.—Toledo, No. 10, made by Pope Motor Car Company, Toledo, Ohio; operated by George Soules.

Class D.—White, No. 5, made by White Sewing Machine Company, Cleveland, Ohio; operated by Webb Jay. White, No. 6, made by White Sewing Machine Company, Cleveland, Ohio; operated by Paul H. Deming. Pierce Arrow, No. 14, made by George N. Pierce Company, Buffalo, N. Y.; operated by Charles Sheppy. Packard, No. 16, made by Packard Motor Car Company, Detroit, Mich.; operated by T. E. Fetch.

Class E.—Stearns, No. 35, made by F. B. Stearns Company, Cleveland, Ohio; operated by F. B. Stearns.

Class G.—Columbia, No. 2, made by Electric Vehicle Company, Hartford, Conn.; operated by B. B. Holcomb.

Second class certificates will be issued to the following:

Class A.—Rambler, No. 17, made by T. B. Jeffery & Co., Kenosha, Wis.; operated by Edward Collier. Fredonia, No. 20, made by the Fredonia Manufacturing Company, Youngstown, Ohio; operated by F. L. Thomas. Oldsmobile, No. 39, made by the Olds Motor Works, Detroit, Mich.; operated by C. Roberts. Oldsmobile, No. 41, made by the Olds Motor Works, Detroit, Mich.; operated by L. L. Whitman.

Class B.—Fredonia, No. 19, made by the Fredonia Manufacturing Company, Youngstown, Ohio; operated by C. T. Gaither. Knox, No. 23, made by the Knox Automobile Company, Springfield, Mass.; operated by Howard M. Davis. Franklin, No. 26, made by H. H. Franklin Manufacturing Company, Syracuse, N. Y.; operated by W. H. Bex. Franklin, No. 27, made by the H. H. Franklin Man-

ufacturing Company, Syracuse, N. Y.; operated by C. A. Benjamin. Haynes-Apperson, No. 30, made by the Haynes-Apperson Company, Kokomo, Ind.; operated by Frank Nutt. St. Louis, No. 42, made by the St. Louis Motor Carriage Company, St. Louis, Mo.; operated by C. P. Dorris.

Class D.—Knox, No. 24, made by the Knox Automobile Company, Springfield, Mass.; operated by J. E. Cowan. Knox, No. 25, made by the Knox Automobile Company, Springfield, Mass.; operated by Frank H. Fowler. Haynes-Apperson, No. 31, made by the Haynes-Apperson Company, Kokomo, Ind.; operated by H. W. Lauterman.

Class G.—Columbus, No. 3, made by the Electric Vehicle Company, Hartford, Conn.; operated by L. Duffie. Toledo, No. 9, made by the Pope Motor Car Company, Toledo, Ohio; operated by H. W. Winters. Locomobile, No. 36, made by the Locomobile Company of America, Bridgeport, Conn.; operated by A. L. Ricker.

M. Hanotaux's Conclusions

M. Gabriel Hanotaux, formerly French Minister of Foreign Affairs, has become a special writer on automobile subjects. As M. Hanotaux is the owner of a Paris daily, he has a considerable advantage over the ordinary person entering this line of work, and avoids all difficulties in getting his copy printed, though his contemporaries do not seem to think very highly of it. The first subject to which M. H. has turned his attention is the momentous question of the gender of the word "automobile," and he reaches the conclusion that although a chaos exists in this respect at present, the Government will eventually enforce the general use of the masculine gender. Next in succession the subject of special automobile roads is discussed. "Mixed circulation," says M. Hanotaux, is a provisional, empirical institution. The future will see roads perfectly adapted to each class of vehicles. During the course of this article the very novel idea of a rubber carpeted road—noiseless, adhesive, resilient and fast—is promulgated. The French say that when he was Minister of Foreign Affairs M. Hanotaux was always foreign to the affairs of his office, and it would appear that as an automobile writer also he is not in touch with the practical end of the business.

To Secure a Rubber Patch.

A method of securing a rubber patch on an inner tube is described in a French contemporary. After the patch has been pasted in place with solution, in the usual way, the tube should be inflated to its normal size and a patch of rubbered fabric one-half inch larger on all sides than the rubber patch solutioned over the latter,

COMMUNICATIONS.

Calcium Chloride Anti-Freeze Solution.

Editor HORSELESS AGE:

I am in receipt of a letter dated November 1, from S. D. Ross, of Madison, Wis., kindly forwarded me through your office, and attach hereto copy of my answer to Mr. Ross, which may possibly be of sufficient interest to your readers to warrant its publication. E. E. KELLER.

[INCLOSURE]

Since writing the article you refer to experience has not indicated any trouble from calcium chloride cooling mixture, excepting possibly in systems where considerable galvanized iron is used or where aluminum tubing forms a part of the circulating system, in which cases there might be a possibility of trouble, although there is no clear evidence of it, provided that the calcium chloride solution is maintained in a neutral or alkaline condition. Commercial calcium chloride is not always perfectly pure, and it is well to add a few handfuls of air slaked quicklime in making up a solution. One of the important requisites in using this solution successfully is that any evaporation must be replaced by adding water, and not by additional solution, as the latter, of course, would result in making the solution gradually more and more dense, and, therefore, running the chance of crystallization in the cooling tubes when the outfit is standing idle in low temperature. These crystals would clog up the tubing so that there would be no circulation until the crystals had been removed or dissolved. If evaporation is carefully replaced by pure water, and leakage replaced by additional solution, there will be no trouble. In some machines it is difficult to determine how much of a loss in the cooling system is due to leakage and how much to evaporation. In such cases it would be necessary to draw off a sample of the solution occasionally and measure its density with a hydrometer, so that the density at 60° Fahr. can be corrected by the addition of calcium chloride or water, as may be necessary.

Why Not Front Drive Racers?

Editor HORSELESS AGE:

Is there any reason, theoretical or other wise, why a front drive, rear steering machine should not be the best type for racing purposes? For commercial or pleasure purposes this type is not suitable for two reasons: first, the loss of traction on ascending grades, and second, the trouble getting away from curbs. But these two elements do not enter into racing conditions. Such a vehicle would be easier to steer, have no skidding tendency, and take

off the terrible side strains that the rear tires and wheels are now subject to, such accidents as happened the other day to the "Gray Wolf" at Brighton Beach would be almost impossible, and I believe there would be a gain of several seconds in track records.

HARRY E. DEY.

Satisfactory Cushion Tires.

OGDEN, Utah, November 2.

Editor HORSELESS AGE:

I have run an airless tire on the rear wheel of an Olds 1,400 miles during the last three months; have picked up seven nails, four of which were bunched in a board found attached to the tire after a night run, causing a wound that would have ruined an ordinary single tube pneumatic. I see no difference in the easy riding qualities, and no signs of giving out; but since the tire weighs 22 pounds it is undoubtedly a handicap to speed. As my other tires fail I expect to replace them with this make.

O. J. STILWELL.

A Correction.

WARREN, Ohio, November 2.

Editor HORSELESS AGE:

Your statement on page 457 of October 28 issue in regard to the Haynes-Apperson car, No. 12, in last year's Endurance Contest, is incorrect so far as it relates to the driver. That car was driven by Heber Michener instead of Frank Nutt. Mr. Nutt drove No. 11, a Haynes-Apperson phaeton, and made a non-stop run throughout. Mr. Nutt's recent achievements in the run from New York to Pittsburg prove so conclusively that he is "a driver of resource and determination" that I am sure he does not need the credit of the other achievement, and I do not believe that he would knowingly deprive Mr. Michener of any credit which may be due him therefor. No. 12 was a Haynes-Apperson "runabout," and made a perfect non-stop run on the return trip from Boston to New York.

OBSERVER No. 12, of 1902.

Good Route Through Canada.

Editor HORSELESS AGE:

When American tourists pass through Canada from Windsor to Niagara Falls they make a great mistake in going by way of Chatham, as in the neighborhood of Chatham are found the worst clay roads in Canada, and east of this city, near Thamesville, the roads are very sandy. These two extremes make this route very tedious and slow. By far the best route from Windsor to the Falls leads through Kingsville and Leamington, then over the ridge road through Ridgetown and High Gate, north through Chatham and Wardville, Delaware Town, Lambeth and London. Over these roads an average speed of about 20 miles an hour can be maintained with a good car. On a recent trip to Detroit I left London at noon, and reached Wheatley, a little town not far

from Leamington, in the evening, making a trip of 122 miles. The last 3 miles were made with the lamps burning, and I could have made 20 miles more if it had not been for a tire puncture, which caused a loss of time of about one hour. Everything else worked splendidly.

During this trip we stayed at Detroit for three days, and from there proceeded to Ann Arbor, Mich., and returned by way of Ypsilanti. The trip was about 500 miles in length, and was enjoyed very much by both Mrs. Payne and myself. But I can assure you that our roads in Canada are very much superior to those we found in Michigan (ditches I call them).

I would urge American tourists passing through Canada to use all due care when passing teams here. A number of runaways have been caused the past summer by rapid and reckless driving of touring automobilists, and this has naturally led to some trouble for our local chauffeurs.

WILLIAM PAYNE.

Storage Battery Query.

Editor HORSELESS AGE:

I should like to know the experience of others in the use of storage batteries for ignition in gasoline machines. Are such batteries worthless after being recharged once or twice? Has mine not been properly charged, or was it a defective cell to commence with? When new it covered 800 miles; on the second charge 600, and on the third exactly 400.

O. J. STILWELL.

Trade Literature Received.

The Diamond Rubber Company, Akron, Ohio.—Folder on showing of Diamond tires in the recent endurance contest.

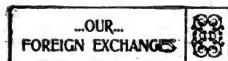
Waltham Manufacturing Company, Waltham, Mass.—Advance circular of the 1904 Orient buckboard.

New York Gear Works, 56 Greenpoint avenue, Brooklyn.—"The Ball Transmission Gear for Automobiles."

The Globe Iron Works Company, Minneapolis, Minn.—Catalogue of the White marine gasoline engines.

Induction Coil Company, of Milwaukee, Wis.—Catalogue of the improved Mueller coil.

In order to combine the advantages of chain and belt drive in motor bicycles the Peugeot firm has devised a new power transmitter comprising both a chain and a belt in one piece. At each side of an ordinary bicycle chain are placed several vertical layers of leather, and the rivets of the chain are lengthened to pass through these layers of leather. The belt runs on flat pulleys, but the motor pulley is provided with a set of sprocket teeth at the middle of its outer surface. There can therefore be no slipping on the motor pulley. The rear wheel pulley, however, has no teeth, and when the belt tension becomes too great there may still be a slight slip.



Acetylene Lamps and Searchlights for Automobiles.

On October 26 last an address was delivered at the annual meeting of the German Acetylene Association, at Eisenach, on the subject of "Acetylene Lamps for Automobiles," by Herr Ernst Neuberg, of Berlin, with the object of interesting the association in a prize competition to be organized jointly by the German Automobile Club, the Mid-European Motor Wagon Association and the German Acetylene Association. The speaker dwelt in the first place upon the probable future of the automobile movement, and upon the importance of proper illumination, and then detailed the requirements made of lamps for this purpose.

If we inquire into the theoretical requirements with regard to the illumination of a vehicle running on unilluminated roads, we reach the conclusion that the road ahead of the vehicle should be illuminated for such a distance that the driver may recognize a road obstacle early enough to be able to avoid it. As the braking power of most automobiles is almost phenomenal, the distance which should be illuminated depends to a large extent upon the quickness of decision of the driver. It is not possible to specify a definite standard for the size of burner as a function of the vehicle speed, as the efficiency varies according to the construction of the reflector, and it also depends upon whether the car is equipped with one searchlight and two side lamps, only two lamps, or only a searchlight.

Another factor which necessitates the carrying of lamps at the front of an automobile is the fact that pedestrians, animals and vehicles on the road should be able to recognize the car from a distance, and to clear the road in time to avoid being run over or coming into collision.

Acetylene illumination has the advantage over all other systems that with it the luminous intensity per unit of flame surface is the greatest, and that the light is comparatively inexpensive.

The following are the essential requirements made of the illuminating apparatus of an automobile: (1) The lamp must be of tasteful form; (2) the material used in the construction of the generator must not be attacked by the acetylene gas; (3) in the construction of the reflector no material (German silver, for instance) must be used which suffers under the heat of the acetylene flame; (4) the lacquer with which the lamp may be coated must not suffer from the heat of the flame; (5) the attachment and locking mechanisms must be so constructed and attached that it is impossible for them to be lost or open during the run; (6) the generator must be

provided with a safety valve; (7) precautions must be taken that neither the gas passage, the water feed channel nor the burner can get choked; (8) the generator must be easy to fill and to clean—the parts to be cleaned must have smooth walls; (9) the lamps must not extinguish in even the strongest wind, independent of direction of same; (10) the cost price must be low; (11) the illuminating economy must be good; (12) in the case of interruptions in the gas consumption with full feed to the generator the economy must not be appreciably reduced, and the burner must resume operation immediately; (13) in the design of the lamps and the lamp hangers account must be taken of the vibrations produced by the motor and by running on uneven pavement; (14) either central generators or lamps with separate generators are to be preferred according to the special application, but in every case at least one lamp must be portable, so as to admit of illuminating all parts inside the vehicle and below it; (15) the possibility of the water in the generator freezing should be kept in view.

The speaker then demonstrated with a number of acetylene lamps and searchlights manufactured by the "Westfälische Metallindustrie" to what degree these different requirements are satisfied by these lamps.

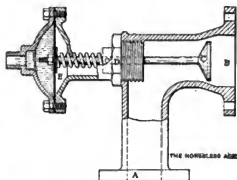
One of the chief requirements, especially in touring, is that calcium carbide of suitable grain may be obtained at supply stations along all the main highways. A firm of petroleum refiners in Germany (Vereingte Benzin Fabriken) has at present in operation nearly a thousand gasoline stations throughout the Empire, and it would be desirable that carbide of the proper sort could be obtained at all of these stations at a uniform price. A resolution was therefore passed at the meeting to request the Carbide Syndicate to open negotiations either with the Vereingte Benzin Fabriken or directly with the individual supply stations, to arrange that carbide of suitable grain be kept on hand at all of these stations and sold at definite prices, and that empty carbide cans be taken back in exchange for the new cans.

Napier Automatic Auxiliary Air Valve Control.

An interesting and novel feature of the Napier cars which will be exhibited at the coming Paris Show is a device whereby the opening of the auxiliary air inlet is controlled by the pressure in the water circulation system. The Napier cars employ a float feed spray carburetor, and, as is well known, with this form of carburetor the mixture becomes richer as the speed of the engine increases, unless an auxiliary air inlet is provided on the intake pipe, which is gradually opened as the engine speeds up. In order to obtain satisfactory results it is necessary that the auxiliary air inlet be controlled automatically by

some force varying with the speed of the engine. Various methods to accomplish this result have been devised, as, for instance, that of Krebs, which depends upon the suction in the inlet passage, which naturally increases with the speed of the engine. Napier, on the other hand, uses the pressure of the water circulation, which, as the water is circulated by a pump driven directly from the engine, also increases with the engine speed.

The auxiliary air is heated and passes through an L pipe fitting (see sketch), which it enters at A and leaves at B. The branch B of the fitting is partly obstructed by a valve C at the end of a stem which passes through the block D and is secured to the centre of the rubber diaphragm E. The outer edge of the diaphragm is clamped between the flanges of the parts forming the diaphragm casing, and a coiled spring on the valve stem tends to keep the valve closed. The outer chamber of the diaphragm casing is in communica-



NAPIER AUTOMATIC AUXILIARY AIR CONTROL.

tion with the water circulation system, as indicated, and the pressure of circulation acting against the diaphragm overcomes the pressure of the spring and forces the valve farther into the fitting. It will be noticed from the sketch that the section of the fitting varies in the vicinity of the valve head, and that when the valve is moved farther in by the water pressure the section of the free passage around the valve increases. Thus more auxiliary air is admitted when the engine runs at high speed. This device does, however, not compensate for variations in the mixture produced by manipulating the throttle valve, in so far as a given throttle position may correspond to different engine speeds, depending upon the load on the engine.

Belgium will most likely also be represented in next year's Gordon Bennett race, four firms, La Metallurgique, Marchienne-au-Pont; the Ateliers Germain, Monceau, and the Ateliers Pipe, Brussels, and one other having offered to build machines for the event. The Belgian Automobile Club has decided to hold a preliminary competition over the Circuit des Ardennes course. Firms entering have to pay a fee of \$1,000, which includes \$200 exacted for the real cup race, and the money will in no case

be refunded. No car will be allowed to compete in this preliminary contest which has not a guaranteed speed of 62 miles an hour.

The "Chambre Syndicale" of French tire manufacturers has given notice of an increase of 15 per cent. in the price of tires.

Italy will compete for the Gordon Bennett Cup next year with three 60 horse power Fiat cars, which will probably be driven by Messrs. Lancia, Storero and Felice.

At the last meeting of the A. C. F. it was decided that manufacturers who hereafter publish any false records in their advertisements will be barred from all future events organized by the club.

The Avenue de la Grande Armée, on which most of the automobile agencies and garages are located in Paris, will probably have its surface tarred soon. A request for a permit has been sent to the municipal council.

The London, England, Office of Works has prohibited the use of automobiles and motor cycles in Hyde Park between Hyde Park Corner and the Magazine. An attempt to have exception made of electric cars has failed.

Scotland Yard, London, has provided itself with six automobiles for the use of its superior officers. As soon as the report of a serious crime reaches headquarters the commissioner touches an electric bell, and within a couple of minutes a motor is waiting at the door. The spectacle of plain clothes detectives being "held up" by a rural policeman for exceeding legal speed ought to provide a lively comedy.

Brake tests of automobiles and horse vehicles were made in the Bois de Boulogne, Paris, on Monday, November 2, before members of the Extra Parliamentary Committee on Automobile Regulations. The experiments were made with two automobiles, a one horse and a two horse carriage. The automobiles, driven at a speed of 11½ miles an hour, were brought to a full stop within 18½ feet, but the carriage required 47 feet.

M. J. Contant, who was appointed by the Technical Committee of the French Extra Parliamentary Commission on Automobileism to draw up a report on the speed limit and other questions, has submitted his conclusions. He recommends that a maximum of 37 miles an hour should be permitted in the country and 12 miles an hour in towns, and that cars should not be authorized which could exceed 37 miles an hour on the level. He regards racing as essential for the development of the industry, and recommends that contests should be permitted under

very careful restrictions, special cars and competent drivers being licensed for the purpose. These opinions will shortly be discussed by the Commission.

Our French contemporary, *La Locomotion Automobile*, has removed its publication offices from 4 Rue Chauveau-Lagarole to 32 Rue Duret, near the Avenue de la Grande Armée, Paris.

Georges Richard, the French manufacturer, has nearly recovered from his accident in the Paris-Bordeaux race last summer. He announces that he will not drive in a race again, but will leave the field for the new men, who, he claims, are more daring, as they do not apprehend the danger.

A double course of lectures is given in Paris under the auspices of the Association Polytechnique by M. Charles Weissmann—every Saturday evening from 8 to 10, at the Bourse du Travail, and every Thursday evening from 8 to 10, at a building in the Rue du Général Foy.

An extraordinary case of automobile robbery was tried at the recent Northampton (England) Quarter Sessions, where a young man named Robert Wilson broke into a garage at Towcester, got out a car valued at £235, and made a bolt for London. He distanced all pursuers on the way, and made a non-stop run of the 70 miles to town. The telegraph, however, was too quick for him, and a police inspector took him into custody at a garage where he had put up the car. As Wilson had previously stolen another automobile at Willesden he got twelve months for his escapade.

A. L. A. M. Matters.

The first annual meeting of the association was held on Thursday, November 5. Officers for the coming year were elected as follows: President, F. L. Smith; vice president, Charles Clifton; secretary, E. H. Cutler; treasurer, Henry B. Joy; executive committee, M. J. Budlong, S. T. Davis, Jr., and Messrs. Smith, Clifton and Cutler. George H. Day continues as general manager.

To the executive committee was left the passing upon the admissibility of and electing new members. Subsequent to the meeting it was stated that the course of the executive committee had been approved by the association.

In reference to the several shows to be held this winter the report that exhibits of members would be placarded with signs warning visitors against purchasing automobiles made by non-members is authoritatively denied, but our informant stated that members would necessarily have to advertise in the usual legal way that their machines are manufactured under the Selden patent in order to protect themselves against infringers.

Four importers are now connected with the association as follows: Charron, Girardot & Voigt Company of America (Smith & Mabley), Central Automobile Company, Standard Automobile Company and E. B. Gallaher.

It is pointed out, however, that they are not members of the association, but licensees under the Selden patent, and that the policy of the association is not to discourage the importing business, but to so regulate it under a license that it will be done by reliable parties, who will carry out their contracts with the foreign manufacturers. In this way every foreign manufacturer will be put on the same basis under the licenses as American manufacturers who are licensed and not members of the association.

The first suit against a purchaser and user of a machine made by an unlicensed manufacturer was filed on November 5 against the O. J. Gude Company, of New York, which owns an automobile manufactured by the Ford Motor Company, of Detroit.

Importers and the Selden Patent.

A dispatch from Paris this week says that M. de Knyff is now forming a syndicate of all the principal French automobile manufacturers with a view to helping the Independent Association of Automobile Manufacturers of America in its proposed fight against the Selden patent. The following named manufacturers are said to have promised their support: De Dion & Co., Renault Freres, Mors & Co., Clement & Co., Mercedes, Darracq & Co., Decauville & Co., and De Dietrich & Co.

On the other hand it is stated that the four importers mentioned elsewhere as having been licensed by the A. L. A. M. have organized the Importers' Branch of the Association of Licensed Automobile Manufacturers, with A. D. Proctor Smith as president and E. B. Gallaher as secretary, and that they have decided to bring an action against one of the unlicensed importers. Among the latter are Alexander Fischer, F. A. La Roche, A. Le Maître, Société Franco-Américaine d'Automobiles, of New York, and Kenneth R. Skinner, of Boston. Of these, it is reported that Messrs. Fischer and La Roche have applied for conditional licenses.

The Great Paris Show.

It is somewhat amusing to read each year some time before the date of the Paris Show how it has been absolutely impossible to accommodate all demands for space, and at the same time see by statistics how the shows have increased in size from year to year. They are always held in the same building, and the only explanation by which the two statements can be made to harmonize is that the building is also endowed with growth.

Opening of the Boston Y. M. C. A. Automobile School.

The automobile school of the Boston Y. M. C. A. Evening Institute opened in Association Hall, Boston, Tuesday night, November 3. Some 200 persons were in attendance, representing Boston's exclusive sets and automobile trade, professional chauffeurs and those who propose entering that line of work. There were also a large number of Massachusetts Institute of Technology and Harvard men, and students came from all over the country—Chicago, St. Louis, Pittsburg, etc.

The school has assumed such large proportions, and so much preliminary work was necessary, that the first evening was devoted to a full presentation of the plans and discussing some points not clear in the minds of the audience. F. P. Spear, educational director of the Evening Institute, emphasized the following points: This school is the first one of the kind on the American continent and probably in the world. That while there are schools in Paris intended to train persons to drive carriages, there is no other school which gives full instruction in the drafting, construction, care, operation and handling of all types of steam, gasoline and electric vehicles. The point was made that in view of this fact, with no data to guide the management of the school, a great deal of thought should be given to preliminary arrangements, and much care would be necessary in so systemizing the work as to make it thoroughly comprehensive and plain.

The procedure was outlined as follows: The electric courses are to consist of a presentation of the history of motor traction, tracing development from the earliest period, step by step, up to the present time. The succeeding lectures will deal with the car as a whole, and then in its parts, considering first the steam carriage, with its boiler, engine and auxiliary machinery; great and small repairs, and steam motor cars as freight carriers.

These lectures will be illustrated by lantern slides, cuts, blue prints and parts of carriages. Arrangements have been made for a powerful electric light to be thrown directly upon the pieces of mechanism under discussion, in order that its intricacies may be clearly shown.

Realizing that under the best conditions the lecture course must deal with principles rather than details, the shop or laboratory course has been organized, to be conducted in the Park Square Automobile Station. Blanks were given to the students in attendance for the purpose of ascertaining just which courses they wished to pursue, and then the school was grouped into several classes, as follows:

Group 1—Owners.

Group 2—Professional chauffeurs.

Group 3—Inexperienced machinists who wish to become chauffeurs.

Group 4—Inexperienced artisans, other than machinists, who wish to become chauffeurs.

These various groups are to be placed each in charge of a special teacher.

While the steam carriages are being lectured upon, the shop course will be devoted wholly to the consideration of steam, and lectures and demonstrations will keep pace, there being two shop recitations for one lecture. The drafting course was also outlined and its value emphasized. Some twenty-five men will pursue this course the present year. A 1904 Crestmobile has been provided, which will be drawn complete in detail and assembly. After the engine is finished the other features of the car will be taken up, the measurements being taken directly from the carriage, and a fully finished drawing made of the car and its mechanism. This course will last well into the spring and consist of about 200 hours of absolute drafting.

Since the catalogue was published, arrangements have been made for instructing persons in the operation of cars, and a list of the cars to be taught will be announced at the next lecture.

The advisory board of the school consists of Col. J. T. Soutter, president Massachusetts Automobile Club and N. E. Automobile Association; George H. Lowe, New England manager White Steam Carriage Company; A. F. Neal, Waverley Electric Company; Isaac H. Davis, vice president Crest Manufacturing Company; Dr. Walter G. Chase, chairman Association Educational Committee, and J. S. Hathaway, secretary of the advisory board, with White Company.

Difficulty was experienced in securing lecturers who had the equipment to handle this subject, and yet so from a non-partisan standpoint. The following instructors have been secured: Parker Kemble, consulting engineer; Albert L. Clough, electrical engineer; M. H. Merrill, Jr. Arlington White and Geo. W. Armstrong, draftsman, machinist and engine builder.

New Incorporations.

Covert Motor Vehicle Company, of Rochester, N. Y.—Capital, \$100,000. Directors, W. B. Duffy, W. C. Barry and W. C. Barry, Jr., of Rochester; B. V. Covert, of Lockport, and G. C. Gordon, of Brockport, N. Y.

St. Louis Automobile and Truck Company, of St. Louis, Mo.—Capital stock, \$20,000; stockholders, E. Reubel, C. J. Briner and Ferd C. Schwedtmann.

Havana Auto Company, Boston, Mass.—Capital, \$50,000. President, Joseph E. Barlow; treasurer, Morrell Smith. Will do general automobile business in Havana, Cuba.

At a recent meeting of the A. C. G. B. 1. Colonel Crompton gave it as his opinion that the breaking of crank shafts on gasoline cars is mostly caused by improper handling of the spark control by the driver, and deplored that the drivers are given control over the time of spark.



The United States Signal Corps has been testing near Fort Riley, Kan., the capabilities of its automobile in active army service.

A. R. Mosler, of New York, has removed to 1679 Broadway, and has reduced the price of the "Spit Fire" spark plug to \$1.50.

Ralph Millison, Scott Winne, A. S. Parks, George Spencer, Elmer Reese and Dean Gordon are behind a movement to form an automobile club at Wichita, Kan.

Sales for the week ending November 7 are reported by Banker Brothers Company as follows: Autocars to Dr. Hollister Judd and W. C. Allison and a Waverley to Valentine L. Frantz, all of Philadelphia.

It is stated that five-sixths of the floor space at the fourth annual Automobile Show to be held at the Washington Light Infantry Armory, Washington, D. C., during the week March 21-26, has already been engaged.

The executive committee of the Toronto Junction town council has reported favorably upon the petition of the Canada Cycle and Motor Company, which is about to engage extensively in the manufacture of automobiles, asking for re-exemption from general taxation for ten years.

An exchange says that on November 3 W. E. Eldridge, in a four cylinder 28 horse power touring car, fully loaded, made three trials in ascending Commonwealth avenue hill, Boston, resulting as follows: First, 39.3-55; second, 37.2-55; third, 318. The timing was done by the Chronograph Club.

The Florida Automobile and Acetylene Gas Company has opened a garage at 132 East Bay street, Jacksonville. The officers are: Hugh Partridge, president; M. C. Hutto, vice president, and A. N. Jenkins, secretary and treasurer. The company has the agency for the Ford automobile in Florida and Georgia.

A test of a 3,400 pound automobile equipped with solid tires and a cushion spring, invented by C. L. Horack, of New York, which was made over several miles of rough pavements in Brooklyn on November 8, is reported to have resulted satisfactorily. The cushion is operated by both air and glycerine, the flow being so regulated that it instantly responds when one of the wheels strikes an obstruction, while the reaction is sufficiently retarded to prevent shock. Mr. Horack claims that his device not only possesses the qualities of pneumatic tires in neutralizing slight jolts, but that it also disposes of heavy shocks to such an extent as to

permit of comfortable riding over the roughest roads.

The Providence, R. I., agency for the Autocar has been secured by the Thomas-Law Machine Company.

The automobile department of the F. O. Bailey Carriage Company, Portland, Me., will be greatly enlarged. The company report many advance sales for delivery early in 1904.

A 5 ton Herschmann steam coal truck, manufactured by the Columbia Engineering Works, Brooklyn, will soon be placed in the service of the Communipaw Coal Company, of this city.

We learn that in the California races last week a 24 horse power Pope Toledo took first place in both the 24 horse power class and the California owned cars class, and covered 5 miles in 6 minutes 25 seconds.

Pickford, Limited, one of the largest carriers in England, have ordered two Herschmann steam trucks from the English Steam Wagon Company, who have also booked an order for Spain from the Larinaga Steamship Company.

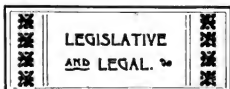
The 1904 Diamond detachable tire will be fitted with fastening lugs covered with rubber instead of with leather, which makes the tire waterproof and prevents chafing. The new lug can be used on all sizes of tires and replaces sixteen different sizes of leather covered lugs.

The rumor that the Decauville Company, of Paris, has discontinued the manufacture of automobiles is stated by the Standard Automobile Company, of New York, to be absolutely without foundation. The report is attributed to the fact that one of the small subsidiary companies had been absorbed by the parent concern.

Arthur S. Lee, Providence, R. I., writes us that he recently made a trip from Cohoes, N. Y., to Providence, R. I., in his 14 horse power Toledo touring car, accompanied by two other persons, starting at 7:40 a. m. on Thursday, October 29, and arriving at 11:45 p. m. the same day. The distance is 205 miles, and 12 gallons of gasoline was used.

Automobiles played a conspicuous part in the recent political campaign in Ohio. Mr. Johnson, Democratic candidate for Governor, and the Republican candidate, Myron T. Herrick, both used their automobiles in the campaign. Mr. Johnson operating his Winton touring car on his trips through the State, and Mr. Herrick directing his Winton in filling engagements in the city.

Joseph J. Mandery, of Rochester, N. Y., has purchased the property at 150 to 160 South avenue, and will erect a new building 66 by 165 feet, exclusively for his automobile business. It will be fitted up with the latest appliances and machinery, and will have every convenience for ladies, such as toilet, telephones, etc. The battery room will be equipped with charging boards of latest Westinghouse design. The garage will be open day and night.



The proposed Quincy, Ill., automobile ordinance is not considered broad enough by the council and has been referred back to the ordinance committee.

A special committee has been appointed by the Minneapolis (Minn.) city council to take under consideration the general subject of establishing a maximum speed for automobiles and of licensing operators.

The Marion, Ind., city council has adopted an ordinance limiting the speed of automobiles to 5 and 8 miles respectively with and without a square bounded by Second, Branson, Sixth and Boon streets. Violations are punishable with fines not exceeding \$10.

The automobile license ordinance of Toledo, Ohio, does not become operative until January 1. On account of several delays and the inability of the successful bidder to obtain sufficient aluminum the tags have not been delivered, though the law was passed several months ago.

In order to have a higher court pass upon that section of the Bailey automobile law permitting a speed of 15 miles an hour in sections where the houses are more than 100 feet apart, Magistrate Zeller, of New York, this week held Frank Sanford, a chauffeur, in \$100 bail.

A final meeting of the creditors of the Steam Vehicle Company of America, of Reading, Pa., will be held at the office of Referee in Bankruptcy Ruhl, 534 Washington street, Reading, on November 20, to act upon the application of Thomas K. Dalzell for his discharge as trustee.

Creditors of the Morlock Automobile Manufacturing Company, of Buffalo, N. Y., are trying to get hold of ten automobiles which were delivered to J. F. Morlock, president of the company, after the concern was forced into bankruptcy. It is claimed Mr. Morlock has a bill of sale of the machines as security for a loan of \$3,000.

An ordinance limiting the speed of automobiles to 8 and 12 miles an hour within and without a three-quarter mile circle respectively has been adopted by the Detroit, Mich., board of aldermen, but the ordinance permitting auto trucks to have trailers and to carry loads weighing 12 tons through the streets has been referred back to the ordinance committee for further consideration.

C. A. Turner has brought suit for \$5,000 damages against the Cleveland (Ohio) Driving Park Company, the Cleveland Automobile Club and the Baker Motor Vehicle Company upon the ground that he was struck by one of the Baker racing machines at the Glenville race track last summer and had his shoulder broken. He

claims that the accident was due to the negligence of the owners of the track, the owners of the machine and the club which gave the races.

Club Notes.

A. C. A.

The regular "club nights" for members were begun November 10.

A. C. OF AUGUSTA.

The Automobile Club of Augusta, Ga., was formed on October 30. There are about twenty-six automobilists in that city.

SYRACUSE A. C.

It is reported that a proposition for the amalgamation of the Syracuse Automobile Club, of Syracuse, N. Y., with the Syracuse Yacht Club is approved by a large majority of the members of both organizations.

A. A. A.

At a meeting of the board of directors on November 10 S. M. Butler resigned as secretary and C. H. Gillette was appointed to fill the vacancy until the annual meeting. The next meeting will be held in the West, probably in Chicago during Show week.

A. C. OF PITTSBURGH.

The club had a run on Saturday last to Butler and return. It was in charge of the following committee: W. L. Elkins, chairman; Thomas R. Hartley and George L. Hailman, and thirty-five to fifty machines participated. The rendezvous was at the Hotel Schenley.

MASSACHUSETTS A. C.

Work on the new addition to the clubhouse of the Massachusetts Automobile Club, of Boston, will be begun immediately, and it is expected that it will be ready for occupancy by January 1. It will have accommodations for over 200 cars. The club is endeavoring to secure a modification of the city ordinance which excludes automobiles from the park system between 10 a. m. and 8 p. m. On December 12 Charles J. Glidden will deliver an illustrated lecture on his recent European tour.

NEW JERSEY A. AND M. C.

At a meeting of the officers and board of governors of the New Jersey Automobile and Motor Club at Newark on November 4 the following committees were appointed: Membership—J. H. Dawson, W. V. Snyder, Jr., William De Mars House—E. W. Adams, J. W. Mason, Dr. S. E. Robertson, B. S. Whitehead and Dr. Clement Morris. Legal—Dr. H. C. Harris, Dr. James English, J. H. Wood Auditing—Daniel Pierson, Jr., Richard C. Jenkinson, L. L. Staehle. New members were elected as follows: William De Mars, George Rahmann, L. L. Staehle, S. F. Bailey and C. L. Ingraham, of Newark, and Dr. Clement Morris and Dr. G. Carleton Brown, of Elizabeth.

Developments in Automobile Construction.*

The resurrection of automobilism has given greater scope to the mechanical engineer, and has imposed upon him the serious responsibility of producing safe and reliable motors for both public and private service. There has been much discussion as to the best type of motor, but at the present time there are only three general types seriously considered—(1) petrol, (2) steam, (3) electric. Each of these has its partisans, and much prejudice and want of experience still obtain in respect to each of these types. The internal combustion petrol motor has presented the easiest problem to the constructor of automobiles, and is, consequently, the most numerous type at present. The problems involved in the construction of a really efficient steam car are more difficult, and it is only quite recently that a satisfactory solution of these problems has been discovered.

The question of the best type of motor is not one to be settled by prejudice or want of knowledge, but must depend on the degree of perfection to which each type may be brought, and I therefore submit that an examination of some of the later developments in steam car construction merits the attention of all who are interested in automobilism, or in the great question of improved facilities for transportation. For some time past, owing to the large vogue of the petrol motor, the advocate of steam cars has been looked upon as more or less of a freak, and was, for a time at any rate, unfit to be associated with respectable automobilists. One reason for this condition of things was doubtless that a large number of flimsy toy steam cars of American manufacture were flooded upon the market. These cars, although running with the characteristic smoothness of steam, were otherwise of very inferior design and construction, but it has been concluded by many that these represent the full capabilities of steam cars. I hope to show, however, that this conclusion is entirely erroneous.

Apart from their deficiencies in scientific construction, the flimsy character of the work is one of the greatest objections to these cars. This has caused endless trouble, disappointment, disgust and dissatisfaction, and has been discouraging to those who had reason to believe that steam is capable of better things and more reasonable interpretation. There is, however, one great comfort to be found in the fact that, notwithstanding there have been over 4,000 of these flimsy toy cars supplied to the public, there has not been a single case recorded of a boiler explosion, although these cars have, for the most part, been in quite inexperienced hands. This certainly ought to have allayed any lingering suspicion in the minds of any as to the safety of the steam car.

Commercial automobilism, as distinguished from the use of these vehicles purely for pleasure purposes, covers an extremely wide field of usefulness, ranging from the light parcel delivery motor cycle or voiturette to the heavy 6 ton lorry. Between these extremes there is what may be termed the middle class—a large and important one dealing with weights of from half a ton to 2 tons, and I am convinced that the scope is sufficiently large to justify the manufacturer focusing his energies upon one class—rather than attempting to produce cars adapted to both the lightest and heaviest class of work. In fact, for the attainment of the highest excellence of design and construction, specialization upon one useful type or size is essential. Only in this manner can the best results be obtained at the lowest cost.

I propose in the present instance to deal with the middle class of automobilism. The working conditions affecting this class demand the utmost reliability with reserve power, the construction being of the most permanent and durable character; also greater cleanliness is necessary than in the case of the heavier vehicles. In heavy commercial automobiles the driver may get as dirty as he pleases by handling coal or oiling machinery without impairing the respectability of the firm he represents; but the express delivery car and its driver of the up to date house are expected to be clean and smart. If steam can be successfully applied to such service, it must be upon an altogether different basis from the ordinary heavy steam automobile. It is held by some that only the petrol or electric car can be used for a service requiring cleanliness. This conclusion is quite erroneous, and indicates a want of appreciation of the possibilities of the steam type of motor. Our old friend and faithful ally, steam, long and successfully employed for the heavy and rough work, is, I am confident, capable of very distinguished service in a situation of more refined conditions.

One of the greatest essentials in commercial automobilism is reliability and certainty of action. The reputation of steam, as employed for general purposes, stands very high in this respect; and it may be laid down as an incontrovertible fact that a steam engine, constructed so as to utilize the latest developments in the mechanical arts, embodies in greatest measure exactly those qualities which are most desirable in an automobile. That is to say, it will work longer than any other without needing attention or repairs. It needs less skill to run, and possesses a larger reserve power for emergencies. It also needs no complicated and expensive change speed gear. The opponent of steam will admit this, but I have heard him remark that, "Although your engine may bear an excellent reputation, the boiler is a devil." Here, again, our critic speaks as though human progress did not exist, and was incapable of exorcising the

evil spirit or reforming the evil character.

It is necessary to point out that the old conception of a boiler having a firebox into which fuel had to be periodically shoveled, and a chimney which emitted both smoke and steam, is entirely erroneous as to the modern steam generator for automobile purposes. It is no longer necessary to shovel on coals, or to soil one's hands by attending to the fire. A proper system of liquid fuel has settled all that, and has at the same time done away with the smoke trouble, while an efficient condenser has done away with the appearance of exhaust steam, and has made it difficult for the casual observer to tell what is the motive power employed, so little is the boiler in evidence; and I have been oftentimes asked whether the car I was driving was not propelled electrically.

The most vital parts of a steam car are the burner, boiler, condenser and engine. The production of a good boiler or steam generator has been found to rest almost entirely on the production of a good oil burner or heat generator, and the burner and boiler have each to be designed with regard to the other, to the end that when combined they shall form a harmonious whole, which will produce all the steam ever required, from the maximum demands when climbing a hill to the minimum when descending or when standing still. The oil burner must be a clean generator of heat, free from smoke or smell, and as quiet as possible. It must be easy to start, and very flexible in its capacity; that is to say, it shall burn with equal efficiency at all rates of consumption, from the maximum to the minimum, and it should be adapted to use the cheaper grades of oil, which are everywhere obtainable, and which are safer to store and to handle than petrol. The parts of the burner most subject to oxidation should be inexpensive and readily replaced.

The subject of oil burning for steam raising is in itself so large that the whole of the time now available could easily be occupied by investigation into this question. I was tempted to do this rather than deal with the broader subject of the steam car, but in order to make the matter clear, experimental demonstrations are desirable, and without special arrangements for withdrawing the products the atmosphere of the room would soon be polluted in a more objectionable manner than by tobacco smoke. Although a more thorough investigation of oil burners is not now permissible, I may outline the principles of oil burning for automobile purposes.

The first is the selection of the oil to be used. The American steam car constructors have selected petrol or gasoline, which is a much cheaper commodity in the States than here, and the production of a vaporizing burner using petrol is a far simpler matter than one to use kerosene or paraffin oil, but the use of this

* Paper read by T. Clarkson before Section G of the British Association.

latter oil possesses many advantages. First, that it is only one-third the cost per gallon; secondly, that it has a higher calorific value; thirdly, it is safer to handle and store; fourthly, it may be obtained not only in this country, but in almost every part of the world which has been reached by civilization. Another important advantage in the use of paraffin instead of petrol is that the world's supply of paraffin is so much greater, and the present upward tendency in the price of petrol, consequent upon the spread of automobilism, is an indication of the need for tapping the larger supply of paraffin. Both of these fuels are derived from the same crude petroleum, which is capable of yielding from 10 to 15 per cent. of petrol and from 30 to 45 per cent. of paraffin oil. For these reasons I have endeavored to devise a satisfactory burner to use the oil which occurs in the greatest abundance, and which possesses such important advantages over petrol.

Thick black oil can be burned with a blast of air or steam, but it is liable to smoke occasionally. Starting is difficult with it, and the use of another fuel for starting purposes is not permissible. Paraffin or kerosene has been found to work fairly well in an ordinary internal combustion motor for stationary purposes, where, of course, the exhaust products can be carried right away, but for automobile purposes it has not been so successful. It can, however, be burnt under a steam generator so as to produce a perfectly unobjectionable product. The oil may be burnt either from wick or by a spray produced by air or steam, but these methods are not so satisfactory as vaporizing, the oil mixing with air and burning atmospherically, as in a burner of the Bunsen type. The great difficulty experienced in producing an oil vapor burner of this type was to prevent "lighting back," or preventing the flame from getting inside the mixing chamber. Various arrangements of single and multiple gauze, perforated grids, fine slits and holes were tried, and even the circulation of water round the upper part of the burner in order to keep it cool, but none of these have proved satisfactory. The action of gauze or perforated metal to prevent the passage of flame, as was shown by Sir Humphrey Davy, depends upon the rapid conduction of heat, in order to maintain the temperature on one side of the gauze sufficiently low to prevent the passage of the flame. Since this difference cannot be maintained with any form of gauze or perforated screen inside the firebox, which must necessarily expose a large surface to the absorption of the heat radiated from the flame, it was necessary to use other means, and the most satisfactory hitherto found has been to make the mixture of oil vapor and air issue from the burner with a velocity in excess of that of the propagation of flame.

In other words the mixture of vapor and

air comes out of the burner with such force that the flame cannot get inside. This enables the size of the burner to be very much reduced, thereby reducing its absorbent power for radiant heat, and at the same time it simplifies the form. The great thing is to maintain the velocity of efflux, and at the same time make the burner flexible in capacity. This can only be done by a variation of the orifices of the burner in direct proportion to the amount of fuel which is being consumed. When the burner is at full power, the orifice will be opened to the maximum. When the size of the flame is reduced, the area of the opening must also be reduced proportionately, in order to maintain the velocity of efflux, and thus prevent the flame from getting inside the burner. As the upper part of the burner must necessarily get strongly heated, it is desirable to make the arrangement for varying the area as simple as possible, otherwise it would be liable to stick, and would soon put the burner out of commission.

The simplest form I have found is the mushroom valve, a circular disk carried upon a vertical stem, and being raised or lowered so as to give a greater or less area to the opening for the escape of the fuel mixture. This has entirely got over the difficulty of the use of gauze or perforated screens, but in order effectually to prevent "lighting back," it is necessary that this variation of the opening should be proportioned to the quantity of vapor injected into the burner. The simplest form of valve for the control of paraffin oil vapor I have found to be a cone or wedge, introduced from the front into the jet nozzle. This obviates the use of a stuffing box in the rear, which is bound to give trouble through leakage. At first a cone was used, and was moved in and out simultaneously with the lowering or raising of the mushroom valve. This, however, did not prove satisfactory, and it was not easy at first to see the reason why, until it was recognized that the variation of the area of the jet orifice and the burner orifice were not strictly in the same ratio, the burner orifice varying in arithmetical progression, and the jet orifice varying in a form of geometrical progression. In other words the burner orifice varied in one dimension, and the jet orifice in two. The jet orifice was then made square or rectangular, and a wedge substituted for a cone, thus making the variation in one dimension like the burner orifice. This modification entirely got over the difficulty of the "lighting back" of the burner, and works equally well at all rates of consumption within its capacity.

Next as to the boiler, which may be defined as an absorber of heat, transforming the heat energy of the products of combustion into steam. Trials of various types of boilers, including water tube, fire tube, flash and semi-flash, have resulted in a preference for the simple fire tube for general service and reliability. Good results

have been obtained with other types, and of these I think the semi-flash is the best; that is, the flash boiler with some reserve, and in which the size of the flame is controlled automatically by the temperature of the superheated steam produced. The flash type generator has the advantage of being able to stand overheating without leakage, but its reserve power is small, and limited more strictly to the burner power. It calls for higher skill, and frequently more exertion—for pumping—on the part of the driver. On the other hand, with the fire tube boiler, the risk of overheating is practically eliminated when fitted with a reliable automatic water feed and burner control. Greater steadiness of steaming and a larger reserve power is obtained, also less skill and no labor for pumping against pressure is demanded of the driver.

As the provision of reliable automatic appliances for controlling the fuel and water supply bears such an important relation to the boiler, something must be said about them. The control of the size of flame from the burner is effected by the pressure of steam in the boiler acting upon a piston or diaphragm, which is supported by a spring, this being adjusted to compress when the working pressure is reached. When the spring compresses it permits the burner to be turned down and the size of flame reduced, so as to check the generation of steam. Conversely, when the pressure in the boiler falls, the spring relaxes and increases the supply of heat, so as to make more steam. The regulation of the supply of feed water has not been found such a simple matter. Floats take up a good deal of room and have very little power. One form of float with reciprocating spindle I found to answer very well, but on account of the space occupied its use was not generally permissible. The best arrangement for controlling the supply of water to a boiler of any type—except the flash—I have found to consist of a thermal expansion device, which opens or closes the bypass on the pump delivery. When the bypass is closed the pump delivers the whole of its charge into the boiler, and when the pass is opened it allows either the whole or part of the water pumped to be returned to the tank instead of going into the boiler.

After trying several forms of thermal expansion devices, the simplest and most reliable I have found to be a steel tube placed horizontally outside the boiler at the water level. One end of this steel tube is connected with the upper part of the boiler in the steam space, and the other end is connected to the lower part of the boiler, or water space, through a syphon tube, which forms a lock to prevent convection circulation. This syphon thus remains fairly cool, yet permits the water in the controlling device to stand at the same level as in the boiler. The effect of lowering the water level is to charge the horizontal steel tube with steam from the boiler, and the effect of raising the water

level causes the tube to be filled with comparatively cool water from the syphon. A variation in temperature of 200° is quite feasible, and even with the moderate expansion possessed by steel, it is practicable to make a thoroughly efficient controlling device without having recourse to the more highly expansive, but less reliable metal, copper or any of its alloys. The expansion of the steel tube closes the bypass valve, which is in the form of a circular disk of metal, carried by a diaphragm.

There is one important feature not commonly recognized in connection with the feeding of water to a steam boiler on an automobile, namely, that the boiler is capable of yielding a larger supply of steam for a short time if the supply of feed water is temporarily stopped. With a boiler possessing suitable capacity, it is quite permissible to entirely stop the supply of water to it for several minutes, which makes a marked difference in the reserve steaming power of the boiler, and improves the performance of a car when climbing a steep gradient. As soon as the gradient has been ascended, when the demand for steam is reduced, the feed water may be again admitted, and should the car then be traveling on a down grade, and the demand for steam be entirely stopped, a still greater quantity of water may be fed into the boiler than corresponds to the normal consumption. This variation in the feeding of the boiler, giving less or none at all when ascending, and more when descending, effects a marked improvement in the general running of a car; the steam pressure is maintained more constant, and the car is able to respond to an abnormal demand with greater effect than if the feed is practically at a uniform rate. These remarks, of course, do not apply to the flash boiler, where, unfortunately, owing to the small reserve, it is necessary to increase the quantity of cool feed water introduced into the boiler when a greater demand for steam is made.

This graduated feeding of water, I have found, can be accomplished in an extremely simple manner, by placing the thermo-expansion tube across the rear side of the boiler; that is to say, if the boiler is in the front part of the car, the thermo-expansion device may conveniently lay across the dashboard. Any change in the grade of the road surface produces a corresponding tilt in the framework of the car. As the surface of the water in the boiler remains level, this causes the water to leave the thermo-expansion tube when descending a grade, and to flood it when ascending, thus causing the feed water to be introduced in the desired manner. It will be seen that if the thermo-expansion tube, instead of being placed in the rear of the boiler, were placed across the front, the opposite effect would be produced, and the performance of the car would be depreciated. In addition to the automatic control of the water supply, and the heat supplied from the

burner to the boiler, it is found convenient to supplement this by independent hand control, as, under certain conditions, improved results may thus be obtained.

One of the most important features of the modern steam car is in the employment of superheated steam, and it is probably not overstating the case to say that superheated steam is, next to the provision of a good burner, one of the principal means which has effected the redemption of the steam car. Superheating, like many other things, good in their places, may easily be carried to excess, and the results of my experience indicate that the greatest benefits are to be obtained by a temperature of 650° Fahr. to 700° Fahr., as higher temperatures are liable to cause trouble, but with a properly constructed engine no trouble need be experienced in the use of steam up to 700° Fahr. The great value of superheating is in improving the engine economy by reducing the steam consumption for a given power, and although superheating primarily only affects the engine, it indirectly affects every other vital part of the car. As for a given power the boiler has less steam to evaporate, the condenser has less steam to de- vaporate, and the duty of the pumps is proportionately lessened. The fuel and water consumption is reduced, and range of action or mileage capacity—on a single charge of water and fuel—is proportionately increased. This, of course, necessitates that the engine is constructed to use highly superheated steam, without giving trouble by deformation caused by unequal expansion.

It is inevitable that the parts of the engine to which the superheated steam has access, such as the cylinders and valve chambers, will expand more than the cooler parts, such as the shaft, connecting rods, and valve gear, with which the highly superheated steam does not come in contact. The most satisfactory solution of this difficulty is, not to make two cylinders in one casting, but to have them quite distinct, and each mounted so as to permit of free lateral expansion, without affecting the distance between their centres, and with unrestricted longitudinal expansion, which merely produces a slight alteration in the clearance volumes at each end of the cylinder.

One of the great troubles in the past in the use of superheated steam has been in the rapid wearing away of the packing in the stuffing boxes of the piston and valve rods. For this reason some makers have preferred to use single acting cylinders, which, of course, have only half the power, or, if made of equal power, occupy a considerably larger space.

This also introduces complications in the valve gear, as double the number of single acting cylinders are necessary to give the same advantage in starting. The use of asbestos for packing stuffing boxes for either piston or valve rods has not proved satisfactory, especially as the cars may

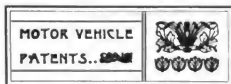
sometimes be out of commission for several days at a time, particularly when used as pleasure vehicles, and during this interval the moisture retained by the asbestos causes corrosion and pitting of rods. This acts like a file the next time the engine is used, cutting out the packing and making it practically impossible to keep the stuffing boxes tight. Another difficulty in the use of ordinary packing is the necessity for frequent adjustment and screwing up of the stuffing box in order to keep it tight, and in frequently repacking. This is an operation which requires a certain amount of experience and judgment, otherwise much harm may be done, and I have therefore sought to eliminate this entirely from the function of the driver.

The improvement in quality of mechanical work, and the greater accuracy now obtainable by the use of the universal grinding machine, has made it possible to adopt a form of rod packing which previously could not be used. The piston rods and valve rods can now be made more truly to approximate to the mathematical form of a cylinder than ever before; and a solid metallic bush or sleeve can be made with about 2000th of an inch clearance, so as to slide with very slight friction over the rod, and remain practically steam tight. This effect is improved by allowing the bush or sleeve to float on the rod, so far as any lateral displacement is concerned, and also by effective lubrication, which preserves a film of oil between the rod and the bush. The latter, being non-absorbent, does not retain moisture to injure the rod when the car is out of commission for a considerable time. This improvement has made a double acting cylinder better adapted to deal with the highly superheated steam, and at the same time has dispensed with the necessity for periodical tightening of the stuffing boxes. The packing will last at least a year, and keeps the rods in excellent condition.

(To be continued.)

Calendar of Automobile Dates and Events.

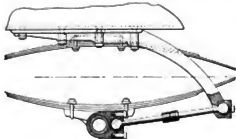
- December 10 to 25—Paris Automobile Exhibition.
- January 15 to 23—Madison Square Garden Automobile Show.
- January 23 to February 4—Brussels Show.
- January 25 to February 6—Meet of the Florida East Coast Automobile Association.
- February 6 to 13—Chicago Automobile Show.
- February 12 to 24—Crystal Palace Show, London.
- February 15 to 20—Detroit Automobile Show.
- March 6 to 12—Buffalo Automobile and Sportsman Show.
- March 19 to 26—Agricultural Hall Show, London.
- March 21 to 26—Washington Automobile Show.



United States Patents.

740,051. Vehicle.—Clement Smith, of Topeka, Kan. September 29, 1903. Filed January 14, 1903.

Relates to spring braces, consisting of an arm rigidly secured to the vehicle frame



No. 740,051.

and extending downwardly and longitudinally forward therefrom, and an adjustable, two part distance rod with ball ends interposed between the forward end of this arm and the front axle.

741,365. Electric Igniter for Hydrocarbon Engines.—James W. Packard, of Warren, Ohio. October 13, 1903. Filed November 14, 1902.

This patent relates to a modification of the Packard automatic timer, as applied to a four cylinder vertical engine. Referring to the drawing, upon the end of the engine shaft are mounted a centrifugal governor and a sliding collar having two grooves, one of which is engaged by the arms of the governor. The other groove in the collar operates a lever, which engages a collar on the cam shaft. Connected to rotate and slide with this collar is a cylinder of fibre, and in the periphery of said cylinder is embedded a diagonal plate of brass. When the engine is stopped, the parts occupy the position shown in the figure. When the engine is running, the collar and cylinder on the cam shaft move inward as the speed increases, thus causing the contact plate to reach the contact points earlier in the rotation of the cam shaft and

advance the sparks with relation to the movements of the pistons. The contact points are carried on spring fingers, to which the circuits are connected.

The contact plate does not extend to the outer end of the fibre cylinder, there being a plain ring of insulating material at the outer end upon which the contact points may, thus shutting off the igniters entirely when the speed of the engine reaches a certain maximum.

739,943. Electric Igniter.—E. J. Stoddard, of Detroit, Mich. September 29, 1903. Filed June 12, 1901.

The invention relates to a make and break ignition apparatus. The novel points are that the spark coil has a closed magnetic circuit and that the ignition circuit is closed outside the cylinder at different periods with relation to the cycle of the engine, according to the speed of the latter. The circuit breaking device consists of a drum with a contact strip having a spiral edge, and the contact brush is moved in the direction of the axis of the drum by a ball governor as the speed of the engine varies.

740,924. Electric Sparker for Explosion Engines.—Eugene C. Richard, Detroit, Mich. October 6, 1903. Filed February 18, 1902.

740,396. Combined Vehicle Door and Seat.—Lee S. Chadwick, Ridley Park, Pa. October 6, 1903. Filed February 11, 1903.

740,564. Friction Clutch.—John H. Hendrickson, Baybridge, Ohio. October 6, 1903. Filed August 4, 1902.

740,578. Pneumatic Tire.—Philip Magnus, Collingwood, Victoria, Australia. October 6, 1903. Filed March 30, 1903.

741,684. Jump Spark Ignition Plug.—Joseph H. Lehman, of New York, N. Y. October 20, 1903. Filed February 6, 1902.

741,714. Armor for Pneumatic Tires.—Emil C. Radick, of Menasha, Wis. October 20, 1903. Filed August 7, 1903.

741,791. Speed Regulator for Kerosene Oil Engines.—Feodor C. Hirsch, of New York, N. Y. October 20, 1903. Filed July 5, 1902.

741,824. Gasoline Engine.—Olof E. Pehrsson, of Brooklyn, N. Y. October 20, 1903. Filed February 1, 1902.

741,837. Controlling Device for Motor Vehicles.—Joseph Sachs, of Hainford,

Conn. October 20, 1903. Filed April 21, 1900.

741,923. Sparker for Gas Engines.—Joseph A. McGee, of Big Spring, Ind. October 20, 1903. Filed October 25, 1902.

741,931. Motor Vehicle.—Axel W. Sandell, of Chicago, Ill., assignor of one-half to Jacob Lauth, Chicago, Ill. October 20, 1903. Filed October 18, 1902.

741,959. Vaporizer for Hydrocarbon Engines.—Victor J. Emery, of Quincy, Mass. October 20, 1903. Filed December 1, 1902.

741,985. Gas Engine.—Ralph P. Thompson, and Emil Koeb, of Springfield, Ohio. October 20, 1903. Filed December 23, 1901.

734,420. Apparatus for Steering Motor Vehicles.—A. Janssens, of St. Nicolas, Belgium. September 22, 1903. Filed December 4, 1901.

Consists more particularly of a novel wheel connection, affording a sufficient place for the arrangement of motor parts between the wheels and allowing the use of straight steering levers perpendicular to the plane of said wheels.

739,687. Driving Mechanism for Motor Vehicles.—F. Küpper and A. E. Vorreiter, of Aix-la-Chapelle, Germany. September 22, 1903. Filed April 4, 1900.

The motor and transmission gear are supported directly on the rear axle.

739,826. Anti-skidding Device for Vehicle Wheels.—Samuel Butler, Westbury-on-Trym, England. September 29, 1903. Filed April 18, 1903.

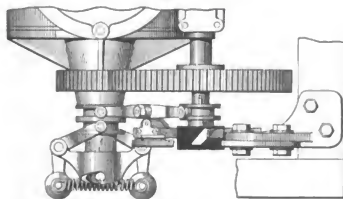
739,830. Cap for Naves of Wheels.—Ferdinand Charron and Léonce Girardot, Paris, France. September 29, 1903. Filed April 22, 1902. Renewed July 24, 1903.

740,138. Rotary Explosive Engine.—Christopher R. James, Jersey City, N. J. September 29, 1903. Filed September 25, 1899. Renewed February 11, 1903.

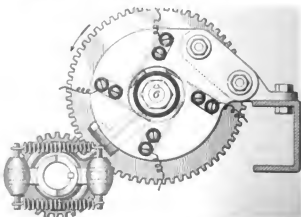
742,167. Vehicle Body.—Frank P. Conrad, Buffalo, N. Y. October 27, 1903. Filed December 10, 1902.

742,413. Motor Vehicle.—John W. Grubbs, Latrobe, Pa. October 27, 1903. Filed February 10, 1903.

742,452. Carburetor.—Benoit de Laitte, Paris, France. October 27, 1903. Filed August 21, 1902.



No. 741,365.



No. 741,365.

742,486. Motor Wheel.—Louis Peter, Frankfort-on-the-Main, Germany. October 27, 1903. Filed January 15, 1902.

742,580. Dust Guard for Autocars.—William H. Brown, Cleveland, Ohio. October 27, 1903. Filed August 13, 1903.

742,651. Speed Regulator for Kerosene Oil Engines.—Feodor C. Hirsch, New York, N. Y. October 27, 1903. Filed July 5, 1902.

742,683. Propelling Device for Vehicles.—Jürgen P. Lange, Passaic, N. J. October 27, 1903. Filed May 14, 1903.

742,726. Primary Battery.—Joseph A. Pedrazzi, Carmel, Cal. October 27, 1903. Filed July 16, 1903.

742,799. Internal Combustion Engine.—Oscar P. Ostergren, New York, N. Y. October 27, 1903. Filed November 4, 1902.

741,008. Roller Bearing.—Frederick E. Brooks, San Francisco, Cal. October 13, 1903. Filed June 5, 1902.

741,044. Storage Battery.—Charles W. Kennedy, Rutledge, Pa.; Sara H. Kennedy, administratrix of said Charles W. Kennedy, deceased. October 13, 1903. Filed March 21, 1902.

741,064. Gasoline Engine.—Joseph A. Nickelson, New York, N. Y. October 13, 1903. Filed June 24, 1902.

741,117. Steering Device for Automobiles.—Adam R. Demory, Toledo, Ohio. October 13, 1903. Filed November 1, 1902.

741,138. Internal Combustion Engine.—Rasmus Jensen, Milwaukee, Wis. October 13, 1903. Filed July 24, 1901. Retnewed September 16, 1903.

741,165. Valve and Igniting Gear for Explosive or Internal Combustion Engines.—Francis M. Rites, Ithaca, N. Y. October 13, 1903. Filed March 1, 1902.

741,166. Valve Gear for Explosive or Internal Combustion Engines.—Francis M. Rites, Ithaca, N. Y. October 13, 1903. Filed May 1, 1902.

741,178. Explosive Engine.—Charles W. Sponsel, Hartford, Conn. October 13, 1903. Filed November 5, 1901.

741,193. Wheel for Vehicles.—Alexander Turkington, Lafayette, Ind. October 13, 1903. Filed July 25, 1903.

741,211. Sleigh Attachment for Automobiles.—Max Abrahamovitz, Yonkers, N. Y. October 13, 1903. Filed January 21, 1903.

741,224. Carburetor for Explosive Engines.—Edwin F. Clark, Cleveland, Ohio. October 13, 1903. Filed October 9, 1902.

741,261. Air Brake for Motor Road Vehicles.—Hans Ledermann, Neumarkt, Germany. October 13, 1903. Filed January 20, 1903.

741,453. Drive Chain.—William M. Butler and Clarence E. Whitney, Hartford, Conn. October 13, 1903. Filed January 14, 1903.

741,510. Variable Speed Mechanism.—Robert Lang, Johnstone, Scotland. October 13, 1903. Filed June 6, 1902.

741,587. Motor Road Vehicle.—Elof H. Meden, Trenton, N. J. October 13, 1903. Filed November 28, 1902.

741,559. Explosion Engine.—Frederick H. Smith, Datchet, near Windsor, England. October 13, 1903. Filed February 4, 1903.

742,857. Battery.—James W. Gladstone, West Orange, N. J. November 3, 1903. Filed September 17, 1903.

743,013. Automobile Steering Mechanism.—Laurence Mott, New York, N. Y. November 3, 1903. Filed November 24, 1902.

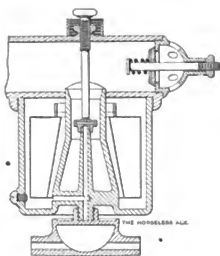
743,043. Vehicle Tire.—George W. Sonthwick, Franklin, Mass. November 3, 1903. Filed August 29, 1902.

741,810. Constant Level Liquid Hydrocarbon Vaporizer for Oil Engines.—Charles M. Mohler, of Kenosha, Wis. October 20, 1903. Filed November 24, 1902.

In this carburetor the principal mixing chamber for air and sprayed fuel is supported directly above the float chamber, and at right angles to the jet of liquid. The device comprises a float chamber which is cast with a central opening through it, and is closed on top by the casting forming the mixing chamber. The float is of an annular form, and the float chamber communicates at the bottom with the spray nozzle located in the central opening through the float chamber. Above the spray nozzle is arranged an adjustable valve rod, which aids in pulverizing the jet of gasoline and in spreading it over the whole of the air passage. To the lower end of the spray nozzle is screwed a semi-spherical chamber with two outlets. A portion of the exhaust gases from the engine may be passed through this chamber, and the gasoline in the spray nozzle thereby heated.

The most interesting part of this carburetor is an arrangement whereby additional air is fed at high engine speeds. It is well known that with ordinary forms of carburetor the mixture becomes richer in gasoline as the speed of the engine increases. In the present carburetor the main supply of air passes up through the central opening in the float chamber, but an auxiliary air inlet is provided at the end of the mixing chamber, which is closed by a spring pressed valve. As the engine speed increases the vacuum in the mixing chamber also increases, and this causes the auxiliary air inlet valve to open and admit an additional air supply, thus keeping the proportion of the mixture constant. A throttle valve plate passes through the mixing chamber at the joint of the latter with the inlet pipe.

741,419. Cooling Attachment for Internal Combustion Engines.—John W. Sutton, of New York, N. Y.



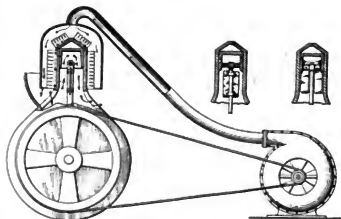
No. 741,810.

October 13, 1903. Filed November 22, 1902.

The cooling attachment is so arranged as to supply a continuous current of atmospheric air to the interior of the piston and cylinder and to the exterior surface of the cylinder, so as to exert an effective cooling action on the heated parts. The invention consists of an internal combustion engine, the crank case of which is provided with openings, a fan rotated in connection with the crank shaft of the motor, a channel connecting said fan casing with a hood extending around the head and exterior portion of the cylinder, and an auxiliary channel for conducting an air current to the interior of the piston and cylinder, so that continuous currents of air are supplied to the interior and exterior surfaces of the cylinder.

The invention consists further in diametrical deflecting plates on the connecting rod of the piston below the wrist pin of the same or attached to the inside of the piston on each side of the connecting rod, said deflecting plates being arranged at right angles to the direction of the current, so as to deflect the current into the piston and cylinder, and then through the crank case to the atmosphere.

743,064. Gas Engine.—Edward N. Dickerson, Stovall, N. C. November 3, 1903. Filed August 9, 1900.



No. 741,419.

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Number of Cylinders.

This is the time of the year when manufacturers announce their products for the coming season. As usual, some of the gasoline car manufacturers have changed the number of cylinders of their motors and have favored us with the reasons which led them to make this change. The question, "How many cylinders?" is truly one of the great questions of automobilism, which, like the great questions of politics, are always with us. In this connection it may have been observed that although it is quite common for a manufacturer to increase the number of cylinders, no case is on record where the number of cylinders has been reduced. Yet probably more single cylinder cars are still being sold than multi-cylinder cars.

It has been observed that users of long standing have in many instances gradually changed over from the small runabout to the large touring car. A similar tendency has been noticeable among manufacturers, though perhaps no manufacturer has yet passed from one extreme to the other, as have some users. Many of the manufacturers who started by building very small cars have each year added to the weight and power of their machines, and in some cases, naturally, also to the price. The change from one cylinder to two, from two to three, etc., is probably only one phase of the tendency just noted.

Among the new cars which have so far been announced this season we note some new three cylinder ones, and one with six cylinders. Three cylinder construction undoubtedly represents very good engineering practice. A three cylinder vertical motor is always far better balanced than a two cylinder vertical motor, and it requires a much smaller flywheel. As regards balancing the three cylinder is about the equal of the two cylinder horizontal opposed. The latter type seems quite a favorite at present for light cars, where short strokes can be used,

but for heavy cars the total length is necessarily very great and the engine somewhat inconvenient to place. The three cylinder engine is inferior to the four cylinder in all the good qualities which are sought by multiplying cylinders—viz., mechanical balance, constancy of torque, etc. The difference is slight however, and as the simplification of one less cylinder is a consideration, it is not unlikely that some of the builders of four cylinder cars will eventually change over to three.

As to the six cylinder idea, we are strongly inclined to the belief that the manufacturers who have embodied it in their new model were actuated more by a desire to have some conspicuously exclusive feature in their design than by a view to actual improvement. There is no question that a six cylinder engine gives a more steady torque and better balance than a four cylinder, but the difference must be so infinitesimal as to afford no compensation for the added complication.

A. A. A. to Become Active.

At the last committee meeting of the A. A. A. the conclusion was reached that it would be necessary for the association to develop a little more activity than heretofore if it wanted to accomplish any results, and not see other similar organizations forge ahead of it, and a plan of action was decided upon. Those who have followed the development of the association will admit that strenuousness has not been one of its characteristics, and all who believe in the benefits which the automobile movement may derive from thorough organization will no doubt hail the new move with satisfaction. The association in the past has suffered from too close connection with the Automobile Club of America, and from lack of proper management. The field open for such an organization as the A. A. A. is certainly large enough to warrant the maintenance of a separate office and the employ-

nient as manager of an energetic man who can give to it his whole time and attention. An instance of the apparent lack of energy which has prevailed in the conduct of the association is to be found in the attempt to combine the New York State Association of Automobile Clubs with the American Automobile Association. This movement has now been dragging along for months, and of late does not seem to have progressed at all. We are now assured, however, that the amalgamation of these two bodies will be completed within a month.

The course which has been marked out appears to lead in the right direction. The field open to the work of the association is very large, both among clubs and unattached automobilists, and only an energetic propaganda is needed to conquer it. It will not be long before automobile legislation will be on the tapis again in many of the States, when the need of effective organization will be brought home forcibly to the individual automobilist who is endeavoring to fight his battles single handed and unsupported by any organization.

Private Importers and the Selden Patent.

A patent secures to an inventor the exclusive right of making, selling and using his invention, and of granting to others the privilege of making, using and selling it, and if the Selden patent should be declared valid, American automobilists who buy foreign cars directly from the makers abroad, or who buy them of unlicensed agents, would be infringing Selden's patent rights as much as manufacturers in this country who had no license under the patent. Particular attention has been directed to this point only recently, since a number of importers have been licensed under the Selden patent. These importers are naturally very much opposed to the practice of private individuals buying their cars abroad, and would be much interested in seeing a stop put to it, either through the agency of the Selden patent, or in some other manner. On the other hand, the private importers, who include most of the leading financiers of the country, are interested in retaining the privilege of buying their cars in the open market wherever they like, and will undoubtedly continue to import their cars themselves until a court decision has been rendered affirming the validity of the Selden patent. If the litigation should take a turn favorable to the Selden interests, those who affect foreign cars would probably be

forced to buy through agencies here. It would not be impossible for the owners of the Selden patent to issue individual licenses to private importers, but this system would be fraught with many difficulties and would undoubtedly be strongly objected to by licensed importers.

Recommendations to the French Extra Parliamentary Committee In Regard to Auto Traffic.

Shortly after the Paris-Bordeaux race last summer the French Government became strongly impressed with the necessity of new regulations for automobile traffic, and appointed an extra parliamentary committee to study up this subject. The extra parliamentary committee appointed a technical sub-committee to investigate the question of speed limits, driving permits and races, from a technical standpoint, and to make recommendations on these points. The technical sub-committee finally appointed a member to make a report on its conclusions and recommendations. This report has just been made public.

The technical sub-committee occupied itself with the following questions: Should a limit be placed on the maximum speed of automobiles, either by administrative or legislative measures? If yes, what should be the limit? Should special permits be issued making exceptions of certain drivers and machines as regards the speed limit? Should races be prohibited categorically or be sanctioned exceptionally.

It must be remembered that the technical sub-committee represented the industry, most of its members being prominent manufacturers. The answers of the committee to these questions reflect therefore to a certain extent the wishes of the manufacturers, with which the extra parliamentary committee wisely decided to become familiar before proceeding with its work. But it is hardly to be supposed that all the wishes of the industry will be satisfied by the Government.

The technical sub-committee recommends a speed limit of 37 miles an hour. Heretofore speed limits for automobile traffic have been enforced by arresting and fining a driver who exceeded the limit and was apprehended by a representative of the law. This method of proceeding was naturally very disagreeable to those unlucky enough to come in conflict with the law—and in France and England they have been many. In future French automobilists are to be spared this annoyance, to a large extent at

least. The recommendations of the technical sub-committee provide that no vehicle capable of exceeding the speed limit shall be permitted on the roads. It is well known that under the present law in France every model of car manufactured must have special governmental approval before it can be operated on the public roads. Under the recommendations of the committee approval would be withheld from cars capable of exceeding 37 miles an hour on the level road.

It is further recommended that special permits be issued to "professionals and certain engineers" exempting them from compliance with the speed regulations, to enable them to test their machines on the roads under the most severe conditions. Races are pronounced necessary to insure further progress in the perfecting of automobiles. It thus appears that such specially licensed drivers are to have the privilege of using the roads for speeding at any time, a recommendation which will hardly meet the approval of the Government.

Housing Cars in Winter.

Cars which are not being used during the winter months should be given a thorough cleaning before they are stored away, and all the bright steel parts should receive a coating of grease, to prevent rusting. The grease may be cleaned off again in the spring with kerosene. When the cars are thus prepared they may be stored in almost any building where they are protected from the weather, although a perfectly dry room is preferable. In any case, previous to storing the machine away, the tires should be taken off, done up in sackings and stored in a dry, dark place, especially if the machine is to be out of commission during the entire cold season.

Cars which are constantly in operation during the winter are preferably kept in a heated room. If kept in a cold room the bearings will be found exceedingly stiff when the machine is taken out in frosty weather, which makes them run much harder. Besides, with many forms of carburetor, difficulties are experienced in starting the motor.

It is not always convenient to heat the auto house. An open fire is not to be recommended, and some users of steam cars who let the pilot light burn under their machines during cold nights have had cause to regret it. The problem is easiest of solution where steam heat is used in the building. We believe it would be very im-

teresting if some of our readers who keep their machines on their own premises would let us know what provision they make for heating their auto houses during the cold season.

Book Review.

Fowler's Mechanical Engineer's Pocket Book, 1904. Scientific Publishing Company, Manchester England.—The present mechanical engineer's pocket book is issued annually, so that in engineering matters which are still in a state of development it is presumably more up to date than the standard, well known mechanical "pocket books" of Kent, Nystrom and Molesworth. It is not as ambitious in scope as any of these books, but its price is also far lower. The subjects treated are the more important of those usually considered in such works, such as steam and internal combustion engines, steam boilers, power transmission appliances, material of construction, machine shop appliances and methods, standards in machine construction, etc. In this last edition particular improvement has been made in the section relating to gas engines, which has been largely rewritten and thoroughly brought up to date.

The matter throughout the book is apparently well selected and the little volume is to be recommended to all who have occasion to make use of mechanical formulae and experimental data.

Competition for Kerosene Carburetors.

In connection with the coming Paris Show there will be a competition of carburetors for ordinary kerosene. The tests will be made in the Exposition Building, the Grand Palais. Following are some of the conditions of this competition: The tests will be made by the jury of the competition with motors placed at its disposal by the executive committee. The jury, which will be appointed by the executive committee, will award prizes, consisting of medals and diplomas, for the most meritorious devices entered. In addition a cash prize of 1,000 francs will be awarded to the best carburetor, provided it operates equally well with kerosene, gasoline and alcohol mixture, without necessitating any changes. The jury will make its awards known on December 25. Following are the characteristics of the kerosene which will be used in the tests: Specific gravity, 800 to 810 at 15° Cent.; flashing points, 35°; freezing point below -12° Cent.

The awards in the fuels competition of the A. C. F. have just been made public. In the class for gasolines over 700 specific gravity a gold medal was awarded to the Deutsch firm and silver medals to Lepretre and Lillie & Bonnières. In the class for light gasolines silver medals were awarded to Lepretre and Lillie & Bonnières, both of which also secured silver medals in the class for carbureted alcohols.

Hill Power of Gasoline Cars.

By ALBERT L. CLOUGH.

(Concluded.)

There is a tradition current that heavy machines are poorer hill climbers than light ones. This or the very opposite may be true, according to circumstances. The fact is that two machines having equal gears, wheel diameters and transmission efficiencies will possess hill climbing capabilities in proportion to their respective "abilities," or, in other words, in proportion to their respective effective horse power per unit of weight. The truth of the statement will thus depend upon which type, the heavy or the light, can show the greatest engine power relatively to its weight. This will generally be the type in which, other things being equal, the motive power plant has the greatest "weight efficiency," that is, the greatest effective power considering its weight. Now, it is a fact that in general the heavy vehicles, such as touring cars, carry multiple cylinder engines and the runabouts make use of single cylinder motors. Several considerations render it possible to build a substantial multi-cylinder engine of higher weight efficiency than can be obtained in a single cylinder construction. Owing to the nearly constant torque produced by a three or four cylinder construction, a relatively small balance wheel is required, and this is a material saving, as the balance wheel forms a large fraction of the total weight of a moderately speeded single engine. The crank shaft of a four cylinder motor being under the influence of a nearly constant torsion of constant direction, rather than the intermittent torque of changing sign characteristic of the single cylinder, may be safely reduced in cross section, and its weight relatively reduced, despite its somewhat greater length. Weight per horse power can be saved in some other directions. Then, again, the four cylinder engine requires only one small carburetor, one muffler of moderate size (both of which are in use without cessation), and one circulating pump, and the proportion which the weight of these accessories bears to the whole motive power weight is smaller than with the single cylinder construction.

RELATIVE WEIGHT EFFICIENCY OF MOTORS.

Cars making use of multiple engines certainly ought to show greater "ability" than those using the single type, whether they be classed as heavy or light vehicles. There is one light gasoline car which is of very high ability, which fact is largely attributable to its being equipped with a three cylinder balanced motor of high weight efficiency.

The fact is that a great many of the big cars are of French extraction, built for use on French roads, and mostly used by people in the large cities who enjoy very easy road conditions, and to many of whom speed is the only desideratum. Being geared for speed at the expense of hill climbing power they naturally give some bad exhibitions on the steep, rough hills of the country dis-

tricts. I think it is inappropriate gearing which has given rise to the aforementioned belief.

It would be interesting if some tests were published as to the efficiency of the bevel gear drive as employed on many of the French type cars, especially in comparison with the chain drive from a motor with transverse crank shaft.

NUMBER OF GEARS.

The number of "gears" or "speeds" which a car should possess is a matter of continual discussion among automobilists and there are many pros and cons, but when the matter of hill climbing capability is under discussion there is little doubt that, aside from all considerations of cost, a three or four speed gear is very advantageous. The main thing is to be sure that the lowest gear is chosen low enough for the very worst conditions. Where only two speeds are provided for, there is a temptation to make the low gear somewhat higher than it ought to be, so as to render traveling less annoyingly slow at the times when the high gear just fails to carry. When the road is just difficult enough to preclude the use of the high, the engine is very lightly loaded on the low, and, unless it has good throttle control, will make bad work of it. Under these particular conditions one is really using an engine of two or three times the capacity necessary and one is always wishing that the low gear was a little higher. When, however, the worst is encountered one may be inconsistent enough to wish that the low was lower. The middle or intermediate gear is just what is wanted to fill the gap. Then one may be contented to make the low gear as low as it ought to be, to meet all emergencies, knowing that it will rarely be called into requisition, as the high and the middle gears will handle everything except the very worst "bunches."

The writer commenced his driving with a two speed gear, graduated into a three speed outfit, and now is sighing for a four speed combination. It is likely that future buyers will, most of them, demand three speeds in all vehicles except the very cheapest cars. The fact that a three speed sliding gear transmission device need cost not so very much more than one of two speeds, and a four speed gear of this type not so much in excess of the three speed arrangement, is likely to make the Panhard or clash system the popular one in the future, when more than two speeds are called for. No one who has ever used a three or four speed gear is likely to be satisfied with any two speed arrangement.

MOTOR POWER AT LOW SPEED.

One important characteristic of any motor, as far as its hill climbing capability is concerned, is its ability to give its full power per stroke, even if slowed down almost to the stalling point. Such a motor will often "hang on" and successfully negotiate a hill upon which another may fail. Tightness of the piston and valves, correct

spark position, a carburetor capable of giving a uniform quality of gas at all times and plenty of balance wheel capacity are the important requisites for the attainment of this condition. Even if the piston fits badly the charge may be drawn properly and a sufficient compression realized when at high speeds, as so little time is allowed for leakage; but when the speed is extremely low the full amount of the charge is not sucked (especially if the inlet valves are automatic) and so relatively long a time elapses during the compression stroke that quite a little of the induced charge escapes around the rings or through leaky valves, and the charge that remains never reaches the intended compression pressure. The energy per stroke is therefore much diminished, the motor loses a little of its speed each revolution, begins to labor, and finally stalls long before it would be expected to do so from considerations of size and design.

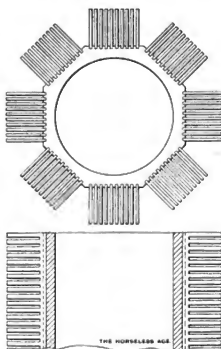
Unless an efficient automatic spark regulator forms a part of the engine it is very difficult to keep the ignition time correct at low speeds; and if not so maintained, the motor rapidly loses its speed and stalls, either from a spark so early as to cause negative work to be done on the piston, or so late as to uselessly transfer most of the energy of the charge into the muffler.

INCORRECT MIXTURE.

There are many carburetors still in use which, while producing a mixture of reasonably constant quality within quite a range of gas demand, produce a very weak mixture at very low speeds. Since the amount of gasoline passing the spraying nozzle in a given time is dependent upon the degree of vacuum surrounding it and this is proportional to the speed of the entering air (the contraction of the air passage remaining constant), it is plain that at very low speeds, when the velocity of the entering air is small, the supply of gasoline may become inadequate to form a rich mixture because the vacuum, increasing as it does more than directly with the air velocity, will then be insufficient to cause as active spraying as necessary; while at high air velocities more than enough may be sprayed.

It is only when a correctly adjusted automatic air intake is provided which increases the degree of contraction inversely to the velocity of the entering air that a perfect mixture may be obtained at all speeds. Somewhat similar results may be obtained by increasing the gasoline flow at very low speeds, or an auxiliary air intake may be used which opens as the gas demand increases and thus corrects the excessive richness of the charge likely to be drawn at high speeds.

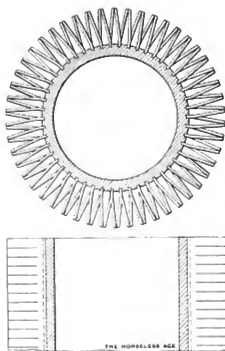
A motor, which, through any of these causes does not run well at low speeds, will force its operator to make an early change of gear when climbing hills and will "pick up" slowly if it is once slowed down. If the operator waits too long before abandoning the high gear, he is likely to find that



JONES' AIR COOLING SYSTEM.

so much momentum has been lost that the middle speed will not carry and he is forced to resort to the lowest gear.

The last recourse in hill climbing is the use of flywheel momentum to urge the ear along by degrees. When the lowest gear fails to carry, the only thing one can do is to speed the motor to the limit, engage the clutch and proceed until the motor is just about to stall; then disengage the clutch and apply the brakes and repeat the process, gaining a few feet at each repetition. This treatment is abusive in the extreme to all mechanical parts of the machine and is at best a desperate expedient.



DARNSTAEDT'S AIR COOLING SYSTEM.

A New Air Cooling System.

A new system of air cooling for internal combustion motors will be employed in a gasoline vehicle now being constructed by the Corbin Motor Vehicle Corporation, of New Britain, Conn. The car is not yet ready for description, but a description of the cooling system is given herewith.

The company owns two patents on methods of air cooling—No. 728,724, of May 19, 1903, issued to James H. Jones, and No. 737,083, of August 25, 1903, issued to Frederick W. Darnstaedt. Jones' method consists in providing the outer surface of the cylinder with comblike stampings of sheet metal. The surface of the cylinder is made of prismatic form, and longitudinal slots are milled into this surface, into which slots are secured the comb shaped radiating members. The advantage of making the outer surface of the cylinder prismatic, instead of cylindrical, is a constructional one, as this admits of cutting all the grooves in one of the plane surfaces with a gang miller in one operation. The radiating members are stamped from sheet metal, the portions between the teeth being removed by the punch. The grooves are made of such width as to insure a tight fit of the comb backs in them. It is suggested to make a holder which will receive all the radiating members for one of the plane surfaces and force all of these members into their respective grooves at the same time by hammer blows or by applying pressure to the holder. Particular attention is called to the higher conductivity of sheet metal as compared with cast metal, and the comb shape is claimed to be of particular advantage in that it permits of a considerable amount of heat being conducted from the upper hot end of the cylinder to the opposite end, insuring a better total radiating efficiency.

Darnstaedt's method differs from Jones' in that no metal is cut away in the radiating strips. The strips are cut into from one side at intervals, and adjacent "tongues" thus formed are bent over in opposite directions. Darnstaedt's method of securing the radiating members to the cylinder also differs from Jones'. His radiator strips are swelled or enlarged along that edge which makes contact with the cylinder, and the slots in which they are placed are originally formed of sufficient width to admit of the insertion of the swelled edge of the blades. When the blades are introduced, the metal of the cylinder adjacent to the slots is expanded by indenting, so as to press the metal of the cylinder into tight contact with the side of the adjacent radiator strip above the thickened portion.

We learn that the method actually to be employed is that patented by Darnstaedt, as far as the form of the strips is concerned—that is, no metal will be removed, but the strips will simply be cut into and adjacent tongues be bent in opposite directions. It is not apparent which of these two systems gives the greatest radiating surface for a certain weight of metal.

LESSONS OF THE ROAD

An Auto Tour in the Prairie States.

By Mrs. WELLINGTON MARTIN.

Desiring to make an extended automobile tour, a diligent study of road conditions led to the conclusion that a trip from Davenport, Ia., to Chicago and Fort Sheridan would be not only feasible but very enjoyable, and, indeed, the good roads we found proved our choice an excellent one.

There was some discussion as to the wisdom of carrying three people on our 4 horse power runabout, but our chauffeur having driven the machine over 3,000 miles a feeling of confidence in her had been engendered that led us to make the trial.

In making cross country runs the nervous strain developed by trying to reach a certain point at a given time is very great, and as our trip was purely one of pleasure and it was immaterial where we were at sunset, provided there were bath, supper and bed, all audible speculations as to the day's probable run were resolutely tabooed.

AN UNEVENTFUL START.

Our first day was uneventful. We made systematic stops every fifteen miles (by odometer) to oil and give the machine a general inspection, realizing that "an ounce of prevention is worth a pound of cure." We continued this course throughout the trip with good results.

We now found the practice of straining gasoline through a chamois skin of value, for we frequently threw out as much as two ounces of water, chamois being impervious to water, and offering little resistance to gasoline.

We also decided it the part of wisdom to take water oftener than was absolutely necessary. To allow the supply to get very low and then throw in several gallons of cold water about a very hot engine did not seem "good sense."

SCENERY AND SAND.

The banks of Rock River afforded some picturesque scenery and considerable sand. For more than a mile the wheels sank to the hubs, and the chauffeur was the only passenger a large part of the way. This was the only sand encountered on the trip, and the only time the machine refused to carry three people.

Our second day was destined to be more eventful. We were making good time over rolling prairies and fine graveled roads, when the engine began to miss explosions. This troubled us for several miles. Repeated investigations led us to conclude that the last gasoline procured was of inferior quality. This was found to be the case, and an adjustment of the set screw in the carburetor remedied the matter.

WEARY WILLIES INTERESTED IN AUTOS.

It was while making this adjustment that we were accosted by two villainous looking tramps. They had shared the contents of a black bottle they carried and were in a convivial mood, and insisted upon climbing into our machine.

Our party consisted of two women and only one of the stronger sex, and as we were unarmed we were compelled to humor them. We had to avow all sorts of good fellowship, and after a bad quarter of an hour succeeded in getting away from a very unpleasant encounter.

We reached Lee Centre at noon, where we took two hours' rest. How that lost time was regretted, when about 3 o'clock the sky assumed a more ominous aspect and a cyclone loomed upon the horizon. Widely scattered farm houses and the nearest village eleven miles away! The throttle was opened and the little machine put to its utmost speed. When within 300 yards of the town the engine gave a gasp

IN THE TRACK OF THE CYCLONE

was exhausting work for the chauffeur. After much skidding, we resorted to roped wheels, and as every few miles the ropes would cut and we had to wade in the mire while rettying them, after a few hours we were not a joy to look upon.

Just as we entered the city, with 15 miles of asphalt boulevard stretching before us, the trained ear of the chauffeur was attracted by an unknown chugging sound from the rear. Dismounting, the rear tire was found to be flat. Our first puncture! A passing automobilist gave the information that no repair man could be induced to come out so late in the afternoon, and advised housing the machine somewhere for the night. "Somewhere" was vague, and, anyhow, such proceeding was contrary to our ethics, and though we had no experience in mending tires we went at it. Briefly, we succeeded, after an hour and a half of hard labor. And we have much to say of the



Photo by Mrs. Martin.

MEETING THE TRANSCONTINENTAL TOURISTS.

—and stopped. Hurriedly dismounting, we cleaned the sparking plug, tickled the needle valve, wiped the commutator block—all to no purpose. The thing seemed almost human. It was tired. We never learned what the trouble was. The dust was eddying and swirling in miniature whirlwinds, and the first big drops plashed heavily. We gave the crank one more despairing turn—when, lo! we were off. We made the nearest barn, and the cyclone passed along the next valley, at the eastern edge of the town. A certain amount of danger may enhance a sport, but an automobile race with a cyclone cannot be recommended.

I might dwell upon some of the humorous features of ambitious country taverns, with their city prices. Suffice it to say in this particular town, after hunting half an hour, we were compelled to send out scouts for the landlord.

The following day we expected to reach Chicago. Steering the machine with a tiller steering device through sixty-five miles of mud and water

COURTESY OF CHICAGO AUTOMOBILISTS.

"Tourists" was undoubtedly written all over us and our machine, and the many kindly offers of assistance we received were very refreshing to our jaded spirits.

Many additional courtesies were extended at the Chicago agency, where our vehicle was housed and cared for for three days.

The last day of our run we had been troubled by a loss of speed, and it was here that an expert suggested the intake lever needed straightening. This accomplished, the engine regained its normal power.

Three days of Chicago boulevards followed, then the run to Fort Sheridan. Too much cannot be said of

THE BEAUTIFUL SHERIDAN ROAD

and the glimpses it affords of blue Lake Michigan. Our pleasure would have been unalloyed but that here the machine began to misbehave. It would miss explosions, choke, emit the most awful fumes and stop. Had it not been for these

fumes some attention would have been paid the theory of exhausted batteries (though these were new).

Reaching Chicago the batteries were tested and the machine thoroughly looked over, but still the trouble continued, and when two nights later, during a moonlight ride in Jackson Park, the machine refused to go more than ten yards at a "cranking," the situation waxed desperate. It was a tired party that brought the automobile into the garage that night.

TOO MUCH GASOLINE.

The matter now became a problem, and if so must be capable of logical solution. It was certainly getting too much gasoline, but how? In the "watches of the night" it flashed into the tired mind of the chauffeur that with the almost constant moting the brass suction valve of the carburetor had become worn, and the set screw was probably too short to properly regulate it. A very early visit to the garage in the morning confirmed this theory. A longer set screw—and the trouble was a thing of the past.

On the return home we decided to take a more northern route, and were rewarded with excellent roads and the pleasure of meeting Messrs. Whitman and Hammond on their transcontinental tour. We recognized them instantly and greeted them like old friends.

After appreciatively examining their one tire placed in San Francisco and still in good condition, we resumed our course, to arrive in Clinton, Ia., the second day following.

From Clinton to Davenport, a distance of 45 miles, the view down the grand old Mississippi is very fine. At last we were home again, the odometer registering 659 miles.

Assuming this article will be read by people fascinated by the joys of automobiling, the troublesome features of the trip have been the more largely dwelt upon. Of its delights—what need of words to those who comprehend!

A Vacation Tour Through New Jersey, New York and the New England States.

By A. H. CHADBOURNE.

The first part of our trip, from Overbrook, Pa., to Poland Springs, Me., was described in THE HORSELESS AGE of September 2 last. The return trip led us through Portland, Me.; Oronquit, Hampton, Exeter, N. H.; Boston, Mass.; Worcester and Springfield to Pittsfield. From Pittsfield we made a trip north to Williamstown and back through Hancock and Lebanon to Pittsfield and thence we continued our homeward journey by way of Lenox, Great Barrington, Millbrook (N. Y.), Poughkeepsie, Fishkill, by ferry to Newburgh, Goshen, Middletown, Port Jervis, Milford (Pa.), Buskill, Stroudsburg, Wind Gap, Easton, Riggsville, Kinnersville. Fernalde, Pipersville,

Doylestown and Willow Grove to Philadelphia.

The return trip from Poland Springs was free from troubles and most delightful. With the exception of having to replace one rear shoe, which gave out shortly after leaving Portland, and the repairing of a broken battery wire near Lebanon Springs, we came home without a single delay or mishap of any kind. We started back August 28 and ran the first day to Exeter, N. H., about 60 miles, where we had planned to visit my old classmate, Charles H. Merrill, at his country place. Mr. Merrill has owned a gasoline runabout for some years, and I noticed he has in his library the files of THE HORSELESS AGE from No. 1, Vol. 1, up to the latest number. On Sunday we took our host and ran down to Hampton Beach, and had a most delightful lobster dinner, and then ran up the coast through Rye to Portsmouth, and back to Exeter, covering some 50 miles over excellent roads. Monday we took a long ride, and Tuesday two of our party went to Boston by rail, as I was anxious to take Mr. Merrill up to Boston on the car and show him what an American built touring car would do over American country roads, after a 1,500 mile trip.

We had a fine run, without a moment's delay, and pulled up at the Hotel Somerset at exactly 1 o'clock, the hour agreed upon to meet the rest of our party for lunch.

The following day we started later than usual, and ran to Worcester, where we refilled the tanks and went on to Leicester Inn. This delightful little inn is situated 6 miles west of Worcester on a hill 1,035 feet above tidewater, and is well kept in every way.

The next morning we ran to Springfield and stopped there for lunch and gasoline. Here we rested for some time, as we saw by the map that Pittsfield was some 52 miles away, and I thought we should find the same good roads we had had since leaving Boston.

We pulled out about 3 p. m., expecting to dine at Pittsfield about 6, but we did not.

For a few miles the road was good enough, but then we got mixed up with the Chester Hills, at the town of Becket, and our troubles began. Narrow, winding roads up the hills or mountains branched off in various ways. Sign posts were few and far between, and houses were miles apart. We are not sure, but think we ran through the town of Becket four or five times without knowing it. In fact we have some doubts as to the true geographical location of the town. However, we emerged from a mountain pass and discovered a town consisting of one visible house and barn. It was nearly 7:30 o'clock and dark and cloudy, but the house was well lighted, and on inquiry I found the people living there took summer boarders. I interviewed the hostess and found she could give us some boiled eggs, bread and butter and tea. That was

enough for us, and while supper was being prepared I charged my searchlight and inquired about the roads. I found little encouragement, but was cautioned about the narrow, sandy roads and bad hills ahead.

We left there at 8:35 and continued grinding our way up and over hills, through woods dark as pitch, until we arrived at Hinsdale, at 9 o'clock.

Here we found an accommodating police officer, who hunted up a storekeeper from whom I got 5 gallons of gasoline, for the hill climbing had made sad inroads on our supply. We found the roads hilly, but better as we continued to Dalton, and from there to Pittsfield, 5 miles, the roads were fine. We reached Pittsfield at 10:45, safe and well, but tired and hungry.

The following day we ran from Pittsfield to Williamstown, where Williams College is situated, and remained there over night at the Greylock Inn. The next day was perfect, and after expressing most of our trunks, which had been forwarded there, home, we started south, feeling that our trip was nearly over and that we really were on our way back once more. We returned by a different and longer route, through Hancock and Lebanon Springs over the fine State road to Pittsfield, where we stopped for lunch and went on through Lenox and Housatonic to Great Barrington, where we put up for the night at the Berkshire Inn.

We left at 10:05 the following day, passing through Salisbury, Lakeville and Amenia to Millbrook, where we stopped for lunch at the Millbrook Inn, a very comfortable little place. From there we ran on to Poughkeepsie and down to Fishkill, where we crossed on the ferry to Newburgh and stopped at the Palatine Hotel for the night. The weather continued fine and we got an early start the next day, leaving Newburgh at 8:15. From there to Goshen we followed the State road, part of which is just being completed. It is a continuation of Broadway, Newburgh runs direct to Goshen, about 25 miles. From Goshen we ran to Milford, where we had a surprisingly fine luncheon at the Hotel Fouchere. Dinner is served at the little house at 1 o'clock, and if touring in that direction, let me advise anyone fond of the good things of life to try to pull in on time.

I had licenses for New York, New Jersey and Philadelphia waving from the rear of the tonneau, but the chief of police of Milford thought I was worth something to him and his friends, so he displayed his badge and requested me to show my Pennsylvania State license. As I could not produce it (having neglected to get one before leaving in the spring), he seemed much troubled and informed me he was legally obliged to arrest and fine me \$100, but he thought if I would give him a ride about town while he gathered up the probatory and treasurer of Pike County, who was mending a fence somewhere, I could be

fixed up. We collected the various officials and I quite forgot that, having been registered in Philadelphia County, I simply required a \$2 license, and was easy enough to let them get \$5 out of me before we went back to the hotel. However, the lunch was so satisfactory, this episode was soon forgotten, and we left about 2:30 p. m., for Easton via Stroudsburg and the Wind Gap. We had intended stopping over night at the Delaware Water Gap, but as it began to look like rain we decided to go on to Easton. The roads to Stroudsburg were very good, but from there through the Wind Gap there were some pretty hard climbs, and the roads were not nearly so well kept.

We spent the night at the new Hotel Huntington in Easton, and were delighted to find there such a well kept house. The proprietor seemed particularly anxious to entertain tourists and showed me to a garage nearby, and did everything to make our short stay pleasant. The house is new and is equal in many respects to the first class hotels in our larger cities. I mention this house particularly because the run to Easton is a most delightful one from Philadelphia, and the town is easy to reach from New York, and other tourists, I feel sure, appreciate the pleasure of coming, perhaps unexpectedly, into a town where they find a really comfortable new and up to date hotel on the European plan and first class. That there are plenty of the second class variety we all know to our sorrow.

The night we spent in Easton it rained hard, but stopped in the morning and by 1 o'clock we started for home.

The hard rain made the shale roads rather slippery, but by careful running we got along without any mishaps. For miles we ran along the old canal, and as we passed mule teams on the towpath patiently hauling the ponderous, slow moving canal boats, while we were gliding along in our modern touring car, I could not help wondering what the builders of that canal would have said could they suddenly have been brought back to life and seen these two methods of travel side by side.

From Doylestown to Willow Grove the roads were better and less slippery, while from Willow Grove to Overbrook the roads are the best macadam. We were home at last, in good time, and a little later, when dinner was announced, I failed to hear any regret from any member of our party.

There was nothing remarkable about our trip. We made no very long daily runs, but contented ourselves with starting when we all felt inclined and stopping for the night at the place we thought would give us the most comfort. I feel on the whole entirely satisfied with the performance of my car. There were some days when nearly the entire run was on roads that were a succession of hard climbs and steep descents that tested both the chain and brakes to their utmost, and not once

did they fail me, and on level roads I had all the speed that safety and comfort permitted.

I was much interested in noticing the action of horses and their drivers in different localities. We had no accident of a serious nature during the entire run. I saw some very amusing sights that would lose too much in their telling to incorporate in this already lengthy article.

I was so fortunate to make the entire run without one puncture, although I had to replace the rear shoes twice, owing to the Clincher rim giving out. The fact that the shoes on the front wheels are the original ones that came with the car, and are today apparently as good as ever, would indicate that a shoe can be made to stand even the strain on the driving wheels if it is large enough and heavy enough.

I have just finished overhauling and cleaning my car thoroughly, and while there were some indications of wear on clutches and bearings, there was nothing that had to be replaced with new parts from the factory.

I used the same pair of spark plugs all summer, and they were old when I started, and my chain seems capable of many a long run. Last evening I had a chance to test it, as I found a friend of mine who had the misfortune to break the crank shaft of his 1,200 pound car 3 miles from his home, part way up a rather long hill. I took him in tow, and although the pull up hill was all my car could do on the low gear and I had to stop several times on the hill for teams to pass, I landed him home and the chain stood up to the work.

If the present improvement in detail continues we shall have a touring car built in this country before long that will outlast any foreign car and give better service for Americans over American roads.

Calendar of Automobile Dates and Events.

- November 26—Eagle Rock Hill Climbing Contest of the Automobile Club of New Jersey.
- December 10 to 25—Paris Automobile Exhibition.
- January 15 to 23—Madison Square Garden Automobile Show.
- January 23 to February 4—Brussels Show.
- January 25 to February 6—Meet of the Florida East Coast Automobile Association.
- February 6 to 13—Chicago Automobile Show.
- February 12 to 24—Crystal Palace Show, London.
- February 15 to 20—Detroit Automobile Show.
- March 6 to 12—Buffalo Automobile and Sportsman Show.
- March 19 to 26—Agricultural Hall Show, London.
- March 21 to 26—Washington Automobile Show.

OUR FOREIGN EXCHANGES.



A New Graphical Method of Solving Pivot Steering Problems.

A theoretically correct steering mechanism satisfies the condition that the axes of all the road wheels produced pass through a line perpendicular to the ground for all positions of the steering gear. If all the wheels are of the same diameter, all the

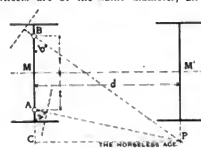


FIG. 1.

axes produced should always meet in a point. Fig. 1 shows that three lines must intersect in a point (P). If CP be a line parallel to the centre line MM' of the vehicle, then

$$\cot a = \frac{AC}{CP} \text{ and } \cot b = \frac{BC}{CP}$$

$$\cot b - \cot a = \frac{BC - AC}{CP} = \frac{AB}{CP} = \frac{2f}{d}$$

To follow this relation between the steering angles analytically for all positions of the steering gear is inconvenient. A graphical method consisting in drawing the prolongations of the wheel axes to the point of intersection at P is much clearer, but for smaller values of angles a and b , which are really the most important, the point P unfortunately falls far outside the drawing.

The following method, Fig. 2, overcomes this difficulty: Draw AA' parallel to MM' , and connect M with A' . Then the radii AO and BO from the pivot points A and B of the steering knuckles to any point O of the straight line MA' form with the front axle AB steering angles a and b corresponding with each other. To prove it, draw NO parallel to MM' . Then

$$\cot a = \frac{f - MN}{NO} \text{ and } \cot b = \frac{f + MN}{NO}$$

$$\therefore \cot b - \cot a = \frac{2MN}{NO} = \frac{2f}{d}$$

It is now a very easy matter to determine the proper angle of one steering wheel for any angle of the other wheel. It is only to be remembered that one of the two angles

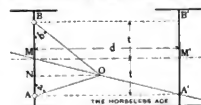


FIG. 2.

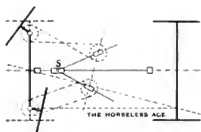


FIG. 3.

is to be measured in the direction opposite to the rotation of the steering wheel.

The theorem thus proven may be stated as follows: If a straight line be drawn through the central point of the middle stationary part of the front axle to intersect the rear axle at a distance from the middle thereof equal to one-half the distance between the steering pivots, radii drawn from these pivots to any point of the straight line will make with the front axle corresponding steering angles.

This theorem suggests immediately an absolutely correct (kinematically) steering arrangement. As only angles are considered, the size of the triangles BOA is of no consequence, and need only satisfy the practical conditions of strength, etc. The arrangement could be as in Fig. 3: The slide S is moved in a direction parallel to the vehicle axis, by means of the steering hand wheel and links. The arrangement is illustrative, though not practical.

This theorem may also be employed to test inaccurate steering arrangements with respect to their deviations from the theoretical requirements. The intersection points of the sides of the steering angles a and b give a curve which deviates from the straight line MA' the more the less perfect the arrangement, as will be explained by a number of examples. To this end the corresponding steering angles (for instance, DAD' and CBC') which result from the

geometrical combination of the steering mechanism to be investigated are laid off on the front axle, both on the same side of the axle and facing each other (MAD' and MBC''), and their sides are prolonged until they intersect in S. If this proceeding is carried through for a large number of different angles, the points of intersection S will form a curve, which will deviate more or less from the straight line L. The curve, when considered in relation to the straight line, gives a true picture of the law of motion of the steering mechanism considered.

As a first example we will consider the very common arrangement of a link rod connecting the two steering knuckle arms directly. The rod may be arranged either to the rear or in front of the front axle. In the diagrams Figs. 4, 5 and 6 the link rod is located to the rear of the axle. The line L may be called the guide line. In Fig. 4 three different shapes of the steering quadrilateral (the quadrilateral formed by the front axle, the steering knuckle arms and the connecting link) are shown. They differ from each other only in the length of the connecting link, the other three sides being in all three cases of exactly the same length. The medium quadrilateral has been so chosen that in the midposition the extensions of the two short sides (the knuckle arms) cut the rear axle at its middle point. This will serve as a base for comparisons.

Let ABC'D' be any position of the quadrilateral ABCD. The angles CBC' and DAD' are therefore corresponding angles. When these angles are laid off on AB from A and B we obtain the sides BC' and AD', which intersect at S. This proceeding has been carried through for a considerable number of positions of the rectangle and the points S thus obtained give the curve d . The portion of the curve d shown corresponds to all positions of the point D

included between D and D₀. The point M corresponds to the midposition of D. The curve portions f and h have been obtained in exactly the same manner. They correspond to the positions of the points F and H of the two quadrilaterals ABEF and ABGH, respectively. For these two curves, too, the point M corresponds to the midposition of the quadrilaterals—i. e., straight forward motion.

Since the curve sections drawn represent the motion of the corner points D, F and H, respectively, to D₀, and since for rotation in the opposite direction (turning to the left), owing to the symmetrical arrangement of the link connections, the corner points C, E and G, on the left hand side, pass through exactly the same angular motions, symmetrically to the middle line, it is concluded that there are exactly similar curve sections on the opposite side of AB symmetrically located. The line MM', or the centre line of the vehicle, is the axis of symmetry of the whole. We thus obtain the dotted curve portions, representing a rotation of the steering wheels to the left. Each complete curve is therefore S shaped.

A glance indicates which of the curves deviates the most from the guide line, and therefore also which arrangement is the least perfect. The curve f makes the greatest deviation, which proves that the quadrilateral must not approach too much to the form of a rectangle.

It would, therefore, be a mistake to choose the quadrilateral ABEF for laying out the construction, or a curve the variable long side of which (connecting link) is still longer than EF. The two other curves, d and h , deserve, however, a close study. Up to a steering angle of 30°—measured on the inner wheel—the curve h is appreciably better than d ; especially for small steering angles it shows only very slight deviations. But beyond 30° h turns away from the guide line very rapidly, while d intersects the guide line at about 45°, and at 50° shows the same deviation from the guide line as its maximum deviation in the opposite direction for smaller angles. The choice of the curve will, therefore, largely depend upon the maximum steering angle required. As with the common rear wheel drive it is hardly possible to exceed a steering angle of 40°, the most suitable quadrilateral of the group shown in Fig. 1 would, in most cases, be one between ABCD and ABGH.

But even when a larger steering angle is admissible, as with front wheel drive, the position of the quadrilateral is narrowly limited, as with large steering angles a dead point is approached. The position ABC'D' in Fig. 1 may be considered the limiting position. The corresponding angle D₀AD' is little above 40°. But for this limited steering motion the corresponding curve is entirely to one side of the guide line. A certainly better arrangement is, therefore, obtained by approaching the curve h —that is, the quadrilateral ABGH.

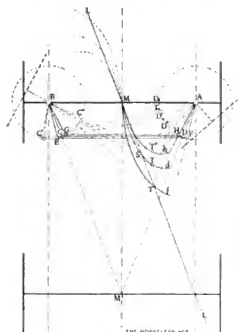
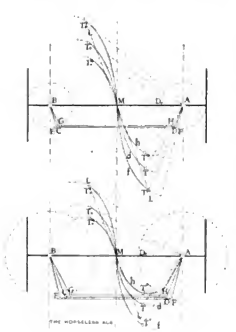


FIG. 4.



FIGS. 5 AND 6.

It must, however, not be overlooked that in this case the permissible steering angle is still smaller, as shown by the figure, the dead points being reached earlier. The points T , T' and T'' are the three dead points corresponding to the three quadrilaterals. The limiting steering angles are, therefore, $T'AB$, TAB and $T''AB$ for the inner wheel, and $T''BA$, TBA and $T'BA$ for the outer wheel, and the smallest angles belong to the quadrilateral $ABGH$.

Figs. 5 and 6 have been obtained in the same manner and under the same suppositions as Fig. 4, with the sole difference that the short sides, AD , AF , AH , BC , EG and BE , of the quadrilateral are smaller in Fig. 5 and larger in Fig. 6 than in Fig. 4. All the angles are the same, as is also the wheel base, although for the sake of simplicity the rear axle has not been drawn in. As the inclination of the guide line to the vehicle centre line fully determines the wheel base, it suffices to draw the guide line at the same angle to the vehicle centre line as in Fig. 4. Each of the Figs. 5 and 6 contains again three quadrilaterals, with the same angles in their midposition as the quadrilaterals represented by the same letters in Fig. 4. This explanation makes these figures at once fully intelligible. As will be apparent, the character of the S shaped curves is changed in such a manner that with an increase in the length of the small sides of the quadrilateral (steering knuckle arms) the curvature is stronger, and the available curve section between the dead points— $T''T$, TT , and $T'T'$ —shorter. In other words, the maximum possible steering angles are reduced. It is, therefore, a mistake to make the steering arms long, as the smaller the arms the more nearly they produce the theoretically correct motion. Of course the mistake should not be made of going too far in this direction, as the stresses on the steering connections are greater the shorter the arms.

The direction of the guide line depends upon the wheel base, which has so far been considered as a fixed quantity. The curves (f , d and h) illustrating the motions produced by the quadrilaterals, as drawn, are entirely independent of the wheel base, and are determined only by the dimensions of the quadrilaterals themselves. This condition plainly shows that a certain steering arrangement is only suitable for a definite ratio of distance between steering pivots to wheel base.

When having to decide upon a steering arrangement one may materially simplify the problem in the following manner. The curves f , e and h are drawn once for all on a large scale as accurately as possible. If a specific case is considered, so that the wheel base is known, the corresponding guide line is drawn, and that quadrilateral is selected the curve of which approaches nearest to the guide line. The somewhat troublesome proceeding of drawing the curves need then only be gone through with once, and for any particular case it is

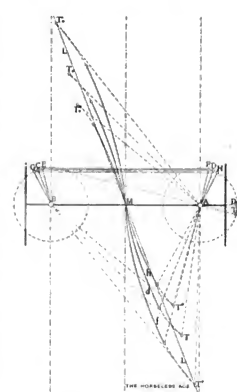


FIG. 7.

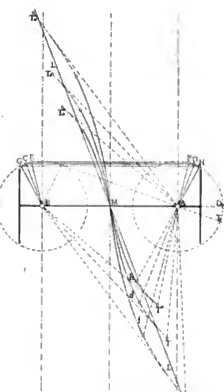


FIG. 8.

only necessary to draw in the straight guide line, which is a very easy matter.

The method of proceeding for any other steering arrangement will be directly obvious from the foregoing. In the case where the quadrilateral is located in front of the axle the method is as shown in Figs. 7 to 9. The denominations are exactly the same as in Figs. 4 to 6, and the same angles and the same guide line are used. The great advantage of the graphical method is here well shown; it is seen at the first glance that with the quadrilateral in front of the axle the characteristic curves are more nearly straight than those correspond-

ing to the arrangement with the quadrilateral behind the axle, consequently approach much nearer to the guide line. Besides, the curve sections included between the dead points are appreciably longer and the limiting steering angles therefore larger, so that this arrangement is in general better than that with the connecting link behind the axle.

With the arrangement of Figs. 7 to 9 the outer ends of the knuckle arms ($CDEFGH$) often come uncomfortably near the wheels, particularly with a short wheel base (GH). This difficulty may be avoided by employing a bell crank pivoted at the middle

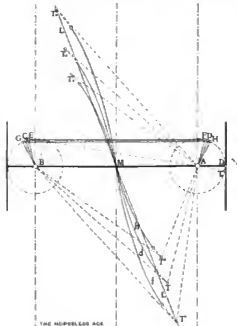


FIG. 9.

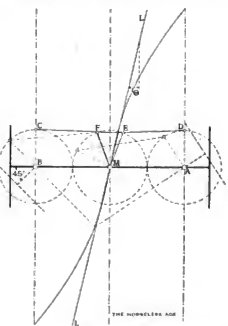
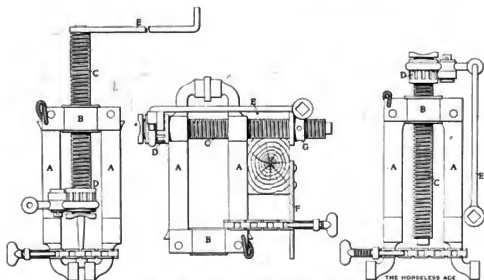


FIG. 10.



COMBINATION DEVICE FOR AUTOMOBILE USE.

of the axle, which is connected by separate links to the steering knuckles. The knuckle arms may then be at right angles to the knuckle spindles. The arrangement is illustrated in Fig. 10, the dimensions in this figure having been chosen so the sides ME and MF of the quadrilateral in their mid-position make with the front axle the same angle as in the preceding figures the sides AD and BC. The characteristic curve of this quadrilateral was then drawn, and finally the guide line, which fits best to this curve up to the point corresponding to a 45 degree steering angle. This guide line almost coincides completely with the curve to the 45 degree point, a sign that the arrangement of steering connections shown, in connection with a wheel base determined by the guide line L, gives a very satisfactory approximation to the correct steering motion. The wheel base may be calculated from the measured angle of deviation θ of the guide line. The cotangent of θ is equal to 4.15, and the wheel base is therefore slightly greater than twice the distance between the front axle pivots.—H. Elsner, in *Der Motorwagen*.

Combination Device to Carry on Automobiles.

The drawings herewith illustrate a device said to be made in France which can be used for a number of purposes by automobilists on the road. It will be seen to consist essentially of two swinging vise arms AA hinged to the yoke B, a threaded shank C, a pawl and ratchet device D, a chain and thumbscrew clamping mechanism and an operating rod E. In Fig. 1 the use of the device as a drill press is illustrated. The part to be drilled is clamped between the vise jaws by means of the chain and clamp screw. A drill is inserted in the end of the threaded shank, and is turned by means of the pawl and ratchet mechanism. Fig. 2 illustrates the use of the device for securely holding pieces to be filed down, etc. The wood beam shown in section evidently represents one of the side frame beams of the vehicle, to which a vertical downwardly extending steel strip is permanently secured. The device is secured to this frame beam by means of a nut G on the threaded shank, and the chain and clamp screw. As the vise jaws

are hinged they would seem to be capable only of taking work of limited size. Fig. 3 shows the use of the device as a lifting jack; the two vise arms are here swung half way round their pivots, against a shoulder stop, in which position they are rigidly held by the chain and clamp screw. The threaded shank is screwed through the yoke, and by means of the pawl and ratchet device and the rod E can be raised or lowered to raise a wheel from the ground or lower it.

Ordinarily combination tools are of no particular value, as in general a tool which can be used for different purposes is not so well adapted to any one of these purposes as a tool specially designed for it. But in the case of tools carried on autos the saving in weight and space of a combination tool would be quite valuable, and any difference in the working efficiency of the combination tool and a special tool would be rarely used.

The construction here shown seems capable of improvement and we hope some American mechanic will take it up and improve upon it.

French Motor Cycle Manufacturers Organize.

A *Chambre Syndicale* of motor cycle manufacturers was organized in France on October 27 last, at a meeting held at 77 bis Avenue de la Grande Armée, Paris. The following officers were elected: M. Mouter, president; Eugene Werner and Georgia Knap, vice presidents; M. Couderc, treasurer, and M. Le Metais, secretary. Membership is open to manufacturers of motor cycles, motors and parts, and the objects of the association are those of the usual trade organizations.

The Dourdan Speed Trials.

A kilometre race was organized by a French sporting publication to be held on the Dourdan road, near Dourdan, on Thurs-



HENRIOT ON A CLEMENT.



DOURDAN SPEED TRIALS.

TWO GEORGES RICHARDS.



NILSEN.



DANJEAU.

day, October 22. The road, which is about a mile and a half long and almost perfectly straight, runs through a forest. The day previous to the race there was a heavy downpour, which made the course very slippery. Nevertheless the day's program was begun on Thursday morning by starting the motor bicycles entered and a few cars of the tourists' section. Then the rain started afresh, and it was thought safer to postpone the event till Thursday, October 29. In spite of the bad weather the attendance was quite large.

The program was carried out on Thursday, October 29. Dubray, with a 100 horse power Gobron-Brillie car, covered a kilometre in 26.2 seconds, a world's record, the Hon. C. S. Roll's performance not being recognized as a record owing to the downward slope of the course. Some illustrations of the meet are shown herewith.

De Dion Two Motor Drive for Electric Cars.

The De Dion-Bouton Company, of Puteaux, France, have brought out a new form of drive for electric cars, in which two motors are employed which are suspended from the body. The drive is by spur gears, and the use of a differential gear is avoided. As will be seen from the sketch herewith, one of the motors is located forward of the rear axle at one side of the car, and the other back of the rear axle on the opposite side. Internally toothed gear wheels are secured to the road driving wheels, and with these gear wheels mesh toothed pinions on short shafts supported in bearings at the end of brackets extending from the axle; these short shafts are connected to the motor shafts by intermediate shafts and universal joints U U. It is, of course, desirable that as the motors move up and down with relation to the axle, the inclination of the intermediate shafts should change as little as possible, and for this reason the motors are carried at the opposite side of the vehicle from the wheel which they are driving.

The Chinese Viceroy Yuan Shih Kai has imported nine automobiles from Germany as a present to the Dowager Empress. They will be used to run between Pekin and the Summer Palace.

The president of the Bavarian Automobile Club has been invited to London to co-operate with the A. C. G. B. and I. in connection with the International Trophy given by Prof. Hubert von Herkomer, to be competed for by touring cars.

At Beaconsfield, England, an automobile driver was fined £10 recently because he drove his machine backward for a greater distance than is reasonable and necessary for safety. His object was to warn others of a police trap.

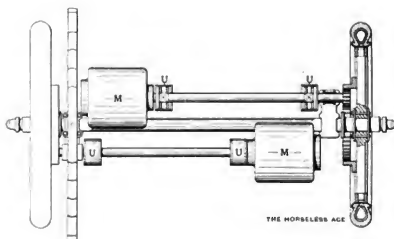
The racing committee of the Automobile Club of France has fixed the entry fee of cars for the Eliminating Trials at \$1,600 per vehicle. A firm entering three cars will have to put up \$4,800. It is hoped by this means to include in the trials only

such firms as have a very reasonable chance of success.

At the next meeting of the Association Générale Automobile on November 27 the topics of discussion will be "The Edison Storage Battery" and "Skidding."

For a temporary remedy for a leaky joint, brown paper first soaked in linseed oil and then well rubbed with graphite is an excellent thing; but the graphite must not be omitted, or the oil will burn up and stick to the joint, and be no end of trouble to remove.

The first prize in the anti-skidding competition of the A. C. G. B. I. will be \$1,000 and a gold medal, and a silver medal will be awarded as a second prize. Originally this competition was announced to be held this month, but owing to the enormous amount of work which has had to be dealt with by the club officials, it will possibly have to take place somewhat later in the season.



THE HORSELESS AGE

The California Races.

Under the auspices of the Automobile Club of California a three days' race meet was held at the Ingleside track, San Francisco, on Friday, Saturday and Sunday, November 6, 7 and 8, respectively. The original program provided for only two days' races, Friday and Saturday, but on Saturday the management announced that it had arranged for another day's events on Sunday afternoon, to afford the general public not able to attend the races on week days an opportunity of seeing Barney Oldfield's exploits. Considerable interest had been aroused in this meet on the Pacific Coast, and the club had succeeded in securing the entry of some of the best racing cars in the country. Barney Oldfield was the star attraction, and besides participating in a considerable number of the competitive events made an onslaught on the mile record. In the latter attempt he was not successful, however, as the track is evidently not comparable with the Empire City track, being too narrow and too sharp at the turns. The weather was ideal the first day, and the spectators numbered about 3,000. As usual on such occasions, many of the spectators came to the meet in their autos.

Before the regular program of the day was begun, Oldfield made an attempt to lower the mile record, but after having gone a mile in 1:04.2-5 he concluded that the track was not in condition to make record breaking possible. The first event of the day was a 2 mile race for gasoline cars of 6½ horse power and under, for two prizes—a \$50 cash prize and a silver cup. Of four entries three started. The event was won by W. S. Hunt, Oldsmobile, in 3:27.1-5. C. S. Luckhardt, Rambler, finished second, in 3:31.1-5, and W. H. Kellogg, Orient buckboard, third, in 3:40.3-5.

In the 5 mile open race for cars weighing 1,200 pounds and under, for two cash prizes of \$100 and \$25 respectively, W. F. Winchester, Franklin, led the lead from the start and won in 8:50.1-5; F. R. Luckhardt, St. Louis, finished second, and W. H. Kellogg, Orient buckboard, third. Luckhardt's time was not taken; Kellogg's time was 9:15.1-5.

The next event to come off was a 5 mile motor cycle handicap race for prizes consisting of silver cups. Eight machines started. The race was won by Thomas A. White, Rambler, 30 seconds handicap, in 10:16.3-5. Second place was secured by H. Swanton, Indian, whose time was 10:31. E. N. Coffin gained third place.

The next race was a 5 mile for gasoline cars of 24 horse power and under, and saw only two starters at the tape—a 24 horse power Toledo, driven by W. E. Saunders, and a 10 horse power Franklin, driven by W. F. Winchester. The race was close at first, the Toledo taking the lead at the start, but losing it to the Franklin in the second mile. It soon regained the lead, however, and won by a safe distance, in 6:46.4-5. The time of the Franklin was 6:52. Saunders carried an extra man in his car, who

balanced himself on the step and leaned far out at the turns.

The fifth race of the day was an open 5 miles for cars of 1,800 pounds and under, for two cash prizes of \$200 and \$50 respectively. In this race Oldfield made his first appearance in a competitive event during the day, driving the Baby Bullet. Besides Oldfield the starters comprised H. D. Ryus and F. A. Garbutt, in White steam cars, and Pierre Desmet in an imported Mors racer belonging to George P. Whittell and said to have participated in the Paris-Berlin race of 1901. Garbutt's steam car led for the last 3 miles and proved an easy winner, in 6:04.2-5. Oldfield finished second, in 6:17.4-5; Ryus, third, and Desmet, fourth. Oldfield led at the start, but something went wrong with his machine.

Another 5 mile race followed, open to all cars irrespective of weight and motive power. The starters were: W. E. Saunders, 24 horse power Toledo; F. A. Garbutt, White; Pierre Desmet, Mors; W. F. Winchester, Franklin; H. D. Ryus, White. Garbutt took the lead at the start, but lost it to Saunders in the second mile, the latter winning, in 6:25. Garbutt finished second, in 7:13, and Desmet a moment later. The Franklin withdrew after the first mile.

The next event was a 10 mile race, in which a first prize of \$400 was offered. In this event both the Winton cars, the Baby Bullet and the Bullet No. 2, ran, the former being driven by William Graham and the latter by Barney Oldfield. There were three other starters, as follows: W. Grothe, White; E. Desmet, Mors, and W. E. Saunders, Toledo. Graham held the lead during the first 5 miles, when he was passed by Oldfield, who then set up a terrific pace and succeeded in lapping all of the other starters, except Graham, before the finish; time, 11:15.1-5. Graham with the Baby Bullet finished second, in 11:51.3-5, and Grothe, White, third. For some reason Saunders' time was not taken, and as he claimed to be entitled to third prize the matter was referred to the referee.

The final event of the day was a 5 mile handicap race for cars owned on the Pacific Coast. The event was won by C. C. Elb, Oldsmobile (2 minutes 30 seconds handicap), who made a time of 8:46.2-5. The Mors car was allowed a handicap of 40 seconds, and won second place. The first prize was \$100 and the second \$50. A third prize consisted of a silver cup.

THE SECOND DAY'S EVENTS.

On Saturday morning there was a heavy downpour and at one time it was doubtful whether the races could be run that afternoon. Toward noon the sun came out, however, and eventually the afternoon events proved exceptionally successful, although no records were broken. The attendance was larger than the previous day, being estimated at 5,000. Two of the seven events of the day were won by Barney Oldfield (Winton), two by W. E. Saunders (Toledo), one by W. Grothe (White), one by W. F. Winchester (Franklin), and one by T. A. White (Rambler motor bicycle).

The first race was called promptly at 2 o'clock p. m. It was 3 miles for cars of 6½ horse power and under, and was won by W. Grothe (White), in 5:25, with a very considerable lead. W. S. Hunt (Oldsmobile) finished second, and W. H. Kellogg (Orient buckboard) third.

In the next race, 5 miles, for gasoline cars of 1,200 pounds and under, W. F. Winchester (Franklin) was an easy winner, in 7:50.1-5. Second place was also taken by a Franklin (driven by R. Fowler), and C. S. Luckhardt (Rambler) secured third place. F. R. Luckhardt, driving a St. Louis, withdrew after the first mile and O. A. McNabb (Cadillac) also withdrew.

The next event was a motor bicycle handicap race, which was won by Thomas A. White on a Rambler, who had also won the motor bicycle race on Friday. He was allowed a handicap of 10 seconds over E. M. Coffin, on a Duck machine, who started at scratch. The winner's time was 8:01.3-5, and Coffin's time, 8:03, the race being 5 miles.

The next event, a 5 mile race, brought Barney Oldfield on the track in the Bullet No. 2. Six machines started in this race, but only three finished. Oldfield took the lead from the start, and was not long before lapping some of the contestants. He kept gaining steadily and made a time of 5:51.4-5. P. Desmet (Mors) finished second, in 6:31, and W. Grothe (White), third, in 6:53. The crowd was as enthusiastic over Oldfield's daring driving as it usually is on the Eastern tracks.

The next race, 5 miles, for 24 horse power cars and under, was won by W. E. Saunders (Toledo), in 6:24.4-5. F. A. Garbutt (White) finished second and W. F. Winchester (Franklin) third. Much interest was shown in the next event, a 10 mile open. Only three machines started, the two Wintons and the Toledo. Oldfield drew ahead from the start, and although the best time for the mile was only 50 seconds it was by far the fastest running that had ever been seen on the Coast. The crowd went wild with cheers as Oldfield passed by the grand stand. His time for the 10 miles was 10:19.1-5. Saunders made a time of 11:29.2-5, and Graham 11:45.1-5. The last race of the day was a 5 miles, and was won by Saunders with the Toledo, in 6:31.

A 5 mile handicap for cars that had participated in previous races at the meeting concluded the afternoon's sport. With a time allowance of 3:45, W. H. Kellogg (Orient buckboard) took first prize in this event in 9:21. A Franklin, driven by R. Fowler, given two minutes and forty seconds handicap, finished second, and C. T. Luckhardt's Rambler car annexed third prize in 9:52. The Toledo was sent away from scratch.

THE THIRD DAY'S RACES.

The Automobile Club of California let it be known that it does not wish to encourage Sunday racing, but thought that now they had Barney Oldfield on the Coast everybody should be given a chance to see him. The last day proved the most excite-

ing of the whole event, both because Oldfield came within one-fifth of a second of the mile record and because one rather serious accident occurred. The attendance this day was estimated at 3,000 and about sixty cars were lined up in the infield.

The accident occurred at the end of the last race of the day—the 10 mile handicap race. When Pierre Desmet, the driver of the French Mors car, pulled up as the winner his friends rushed onto the track to congratulate him, although the other starters were still circling around. Probably thinking that the race was finished, a crowd followed onto the track, including a number of boys. At that time H. D. Ryus, who was driving a White, came down the stretch at full speed, not having completed his 10 miles yet. When he approached the crowd he put on his brakes full force, but before he could stop he struck and knocked down a fourteen year old boy. The boy was found to be unconscious but with no bones broken. He was taken to the Park Emergency Hospital.

The first event of the afternoon was a 5 mile motor race, won by Montie Fink on a California with a 4:40 handicap. Robert Varney, on Thomas A. White's Rambler, from scratch, was second, and H. Swanton, Indian, with a one minute handicap, was third. The time was 12:56.

A novelty race between three Autocars, loaded down with their full complement of passengers, was next. W. W. Everett came first, William Powers second and George Bird third. A 5 mile open event between California owned cars followed. W. Grothe, in a White won; H. D. Ryus, in a White, was second, and W. E. Saunders, in a Toledo, third. The time was 6:30 4/5. Then came another novelty race, this time between Wintons. Barney Oldfield was entered with his touring car, to add interest to the game, and finished third. The winner was George Fuller; C. R. Scott was second. No time was taken.

The next event was a 10 mile race in which Barney Oldfield made one mile, the fifth, in fifty-six seconds. It was this race that brought the crowd in the grand stand to its feet and drew forth spontaneous cheers when Oldfield passed. The race was a free for all, and besides the Bullet No. 2, the two Whites, the Mors and the Toledo were entered, but only Oldfield and Ryus (White) started. Oldfield was an easy winner. Following this came a race in which two Franklins and the Toledo started, and which was won by the latter.

The next event was between two Whites, and from the point of view of a close contest it was the most successful race of the meet. First Grothe would lead and then Ryus, the latter finally screaming in first. The last race, a 10 mile handicap, was won by Desmet in the Mors. A Franklin, driven by Fowler, was second, and Ryus was third. Oldfield was left at the post owing to the failure of his clutch to work.

Following is a summary of the events:

Three mile motor cycle handicap race,

open to machines that started in previous events of the meet.—Montie Fink, California, winner (4m. 40s. handicap). Time, 12:56.

Special 2 mile novelty race for Autocars.—W. W. Everett, 1903 model, winner; William Powers, 1904 model, second; George Bird, 1904 model, third. No time taken.

Five mile open event, for California owned cars.—W. Grothe (White), winner; H. D. Ryus (White), second; W. E. Saunders (Toledo), third. Time, 6:30 4/5.

Special 2 mile novelty race for Wintons.—George Fuller, winner; C. R. Scott, second; Barney Oldfield, third. No time taken.

Ten miles, open event.—Barney Oldfield (Winton), winner; H. D. Ryus (White), second. Time, 9:51 1/5.

Five miles open, for gasoline cars of 35 horse power and under.—W. E. Saunders (Toledo), winner; W. F. Winchester (Franklin), second; R. Fowler (Franklin), third. Time, 8:25 4/5.

Five miles for steam cars.—H. D. Ryus (White), winner; W. Grothe (White), second. Time, 7:23 2/5.

Ten mile handicap, for all cars, irrespective of weight and power.

—Pierre Desmet (Mors), winner (2m. 15s. handicap); R. Fowler (Franklin), second (2m. 30s. handicap); H. D. Ryus (White), third (4m. handicap). Time, 11:42 3/5.

The judges were J. D. Spreckels, R. P. Schwerin and S. G. Buckbee. Referee, L. P. Lowe, W. W. Everett acted as chief timer, aided by Captain L. R. Burgess, John Hammersmith, Edwin Mohr, C. E. Matthews and others. R. C. Lennie acted as clerk of the course, Jack Gleason as starter, Frank Thompson as announcer, and H. C. Brown and L. C. Lowe were the umpires.

Southern California Races.

The Automobile Club of Southern California, Los Angeles, is organizing an automobile meet, to be held November 20 and 21. The program provides for no less than fifteen races, all being for 5 miles, with the exception of two pursuits and two races of 10 miles each. The prizes offered range in value from \$50 to \$250, and entries were to close November 16 with Frank Garbutt in the Conservative Life Insurance Building. The entrance fee of \$10 will be refunded to the starters. The events are to begin each day at 1:30 p. m.

The Cadillac Company, of New York, will soon receive one of the new delivery wagons which are to be a part of its output from now on. It will be of 6 1/2 horse power.

COMMUNICATIONS.

Reflector for Acetylene Lamp.

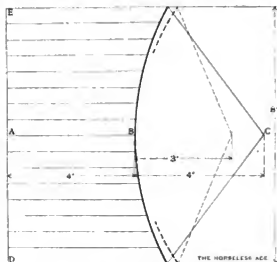
HAMILTON, ONT., November 11.

Editor HORSELESS AGE:

What curve is necessary on the reflector of an acetylene gas lamp to throw the light in a straight beam? The lamp I am thinking of would be 8 inches in diameter, and the length without generator about 12 inches. By having it long the flame would be well away from the reflector, say 4 inches. Suppose the jet to be 4 inches away and the diameter of lamp to be 8 inches, what curve should the reflector have to throw as straight a beam as possible?

H. H. GREENING.

[A reflector having the form of a parabola will produce a beam of parallel rays if the luminous source be a point and lo-



REFLECTOR FOR ACETYLENE LAMP.

ated at the focus of the parabola. In practice the luminous source is, of course, not a point, but the nearest approach to parallel reflected rays is still obtained with a parabolic reflector. For the dimensions you give the distance between the focus and the vertex of the parabola should be 4 inches. The parabola may then be laid out as follows: Along a straight horizontal line lay off three points, A, B and C, making both the distances A B and B C 4 inches. B will be the vertex and C the focus of the parabola. Through A draw a vertical line on which lay off a distance of 4 inches to both sides of A. Divide the distance between the two points D E thus obtained into a considerable number of equal parts, and from each division point draw a horizontal line in the direction of points B and C. On each of these horizontal lines lay off a point the distance of which from the line D E is equal to its distance from the point C. The points thus obtained when connected give the parabola.

A considerable distance of the flame from

the reflector is necessary in order to prevent the reflector from being damaged by the heat of the flame, but to secure the best luminous efficiency with a given diameter of reflector the distance of the flame from the reflector should be as small as possible, as the smaller the distance the greater the cone of light received by the reflector. The light may be considered to be radiated from the luminous source equally in all directions, and the greater the cone subtended by the reflector the more light it receives. In the sketch portions of a parabola with 3 inches distance between vertex and focus have been drawn in, in dotted lines, and it is found that with this distance between flame and reflector the reflector receives nearly twice as much light. However, with a powerful flame 4 inches may be the shortest safe distance.

The centre of the flame, and not the burner tip, should be located at the focus. —En.]

From a User of Electric Vehicles.

Editor HORSELESS AGE:

I am much interested in the development of the electric mobile, as I am using one continually in my practice. I am therefore always glad to hear favorable reports, but that of Mr. Newman in your issue of November 4 seems too good to be true, and has made me question if he did not allow his enthusiasm to run away with him when he wrote that letter to THE HORSELESS AGE. A speed of 18 miles an hour with an average of 60 miles on one charge over country roads is the ideal vehicle that many of us are looking for. It would be interesting to know the kind of battery used, its weight, number of cells, total weight of vehicle, including battery. I wish we might have an electric vehicle contest on speed, mileage on one charge, etc., with entries of practical stock machines only, freight racing machines not to be allowed to contest. I believe the public would be much interested in such a contest. I know a number of gentlemen who do not care for gasoline or steam cars, but are waiting for a reliable electric, good for 50 miles or more over average roads on one charge and at a speed of 18 to 20 miles an hour. The electric motor cars seen in this part of the country are not capable of any such satisfactory result. The one mentioned by Mr. Newman in his letter would seem to meet the requirements, and I certainly hope it does so; but one who has during the past three years tried two different electric cars and found them to fall short of what their manufacturers claim is naturally somewhat skeptical. All of this does not mean that I am disloyal to the electric. On the contrary, my faith is pinned to it and its ultimate success, as evidenced by the fact that, so far as I know, I am the only owner of an electric car in my city. I use it every day, enjoy it very much and find it suits the needs of my profession better than a horse and carriage.

My first auto weighed nearly 3,000 pounds and carried forty-eight cells of battery. This outfit was capable of about 25 miles on one charge with a speed of 12 miles per hour on a level. My present little runabout weighs about 700 pounds, of which 250 pounds is made up of twelve cells of PV9 Exide battery. A radius of 40 miles on one charge at a speed of 14 miles an hour is claimed by the makers. I think it would make 40 miles on a level macadam, which is all the manufacturers claim, but I have never found time to prove it. I have made 30 miles over average roads, taking them just as they come in my business, and without running the battery below 1.5 volts per cell; but I never could make 14 miles an hour. As a matter of fact, 10 miles is about the best I can average on a level. I am waiting patiently for a car which will cover 50 miles up hill and down and capable of 20 miles an hour on a level; one that will average this for a year, not simply when battery and vehicle are new. I ask nothing better and think thousands in this country are waiting to buy just such a carriage.

M. H. BAILEY.

Reply to Mr. Stillwell's Query.

Editor HORSELESS AGE:

Mr. Stillwell's experience with a storage battery has often been duplicated by others having their batteries charged at central stations, as the following sample case will illustrate:

Some years ago an acquaintance of the writer's complained of his experience with a pair of storage cells he had for operating an electric piano. They were supposed to run it for thirty hours, and at first did something like that, but the fourth time only ran it for seven hours and the next time three hours. He was disgusted, as he was paying \$1 every time for recharging, besides the trouble of transporting the battery.

The writer's curiosity prompted him to offer to investigate the case, so taking the cells down to the factory where he was experimenting on an electric automobile he unsealed them—and what a sight met his eyes! The acid was down to within an inch of the bottom of the plates and the latter were entirely coated with sulphate. It looked like a hopeless case. They were, however, given a thorough washing, and a fresh supply of acid of about 1.250 specific gravity given them. Then they were placed on a slow charging circuit for about two weeks, and then, after sealing up, were turned over to the owner. The result was he got more than his rated thirty hours during both of the next two discharges, with which ends the writer's knowledge of their future history.

One of the writer's past experiences was taking charge of a storage battery factory that turned out a good many medical batteries. He could not help but observe the difference in condition of batteries that came in for overhauling, recharging, etc.

Those that had been charged at stations were in uniformly bad order, while those that had been kept on gravity battery circuit were in uniformly good condition.

A glass cover is an excellent thing to have in a battery, as the depth of acid, gassing, etc., can be seen so much better than through the little peep holes of the hard rubber covers. However, one may still have to use the peep hole in the glass cover to see clearly, on account of the mist collecting on the glass.

Possibly Mr. Stillwell's trouble is not in the battery. A change in the distance between spark terminals or other causes could readily account for the difference. The probabilities, however, are that the trouble is due to the battery condition.

For one who understands a storage battery, and has the facilities for recharging, it is the most satisfactory method for ignition. Under other conditions it is very questionable.

HARRY E. DEY.

Long Non-Stop Runs Encouraged by the A. C. G. B. and I.

LONDON, November 7.

Editor HORSELESS AGE:

I beg to inform you that the club have decided that an official record shall be kept here of all absolute non-stop runs recognized by the club. The club is prepared to furnish an official to ride on any car which it is proposed to make such a run, the expenses of the official to be borne by the manufacturer, together with the fee of 2 guineas per day for his services.

It will be necessary for the manufacturers to give proper notice of their proposal to hold a run and to arrange with the club for the attendance of the official in the event of the manufacturer desiring that the run shall be officially recognized by the club.

For the Automobile Club,

BASIL H. JOY,
Technical Secretary.

Experience with Calcium Chloride Solution.

Editor HORSELESS AGE:

I am using a popular gasoline runabout, and in order to prepare for cold weather I ordered some calcium chloride. It came marked "Calcium Chloride, Fused, Merck." I intended dissolving 8 pounds to the gallon, but decided to use five for the present, so I got some clear gallon bottles, put 5 pounds in each with a little piece of lime and filled the bottles up with distilled water. I use only elstern or distilled water, as our water is loaded with lime.

I paid no more attention to the bottles until one night last week it became necessary for me to be away from home, the machine to stand out all night. I looked at the thermometer, which registered 38°. I brought out two bottles of the solution to put in the machine, when I was astonished to find each bottle two-thirds full of crystals. My business was urgent and I had no time to lose. What could I do?

I was afraid to put that crystallized stuff in my machine, so I decided to leave a lantern burning under the coils, as it was a perfectly still night.

About 5 o'clock next morning I prepared to start home, when I could not start the engine. Thinking the oil in the cylinder was thick I used quite a little force, and suddenly the engine let go and started up nicely. When I reached home I ran it in the liveliest stable where I keep it and went to breakfast. In a couple of hours word was sent that something was wrong. I hurried to the stable and found water squirting from half a dozen split places in one corner of the coil where the heat from the lantern had failed to reach. The coils were removed with difficulty, but finally the inner had them soldered and back in place. I filled the tank with water and started out, when I found the engine became hot while the coils remained cool. Investigation showed my pump had frozen and I had twisted it loose. This repaired and a few bills paid made me ready to try again.

I then added sufficient water to the crystals obtained by breaking one of the bottles to make the solution 1 pound of the fused chloride to 1 gallon of water. This I have tried in a test tube instead of in my machine. It has a specific gravity of 1.065 and neutral reaction. I put some in a large test tube and in that a dairy thermometer. I then put the tube with the solution and thermometer in it in a mixture of snow and ice. As the thermometer went down the solution remained clear until at 16° above zero soft ice commenced forming around the glass. This continued until the thermometer reached -2° (below zero), when in about fifteen minutes it froze and burst the test tube.

In your editorial of November 4 you say to dissolve 5 pounds in 1 gallon of water. Five pounds in what form? You can't dissolve 5 pounds of this I have.

Then you say to add kerosene to the cylinder oil. In what proportion? We beginners without experience could use more specific instructions.

J. P. HETHERINGTON.

[The calcium chloride we referred to is the ordinary commercial calcium chloride, containing about six molecules of water of hydration. The proportion we specified was 5 pounds of chloride to 1 gallon of water, not 1 gallon of solution, which gives an entirely different solution density. The safest way of preparing the anti-freeze solution is to first make a saturated solution of calcium chloride and then dilute the saturated solution with water. One gallon of water and 16 pounds of calcium chloride will make about 2 gallons of saturated solution. If to this be added 2 gallons of pure water, 4 gallons of semi-saturated solution are obtained—about the same density as is obtained by dissolving 5 pounds of the commercial chloride in 1 gallon of water. Evidently with such an initial density crystallization begins when the bulk of the

solution in the cooling system has been reduced to one-half by evaporation.

If calcium chloride solution is used in the cooling system it must be given frequent attention or trouble will ensue, no matter what formula is used.

The object of adding kerosene to lubricating oil in very cold weather is to restore the normal consistency of the oil, and the proportional amount of kerosene required would depend on the grade of oil and the temperature. It is impossible to give a formula covering all grades of oil, but it is a very easy matter for a user to thin his oil down with kerosene to the consistency it has at normal temperatures and which he knows insures proper feed of the lubricant.—Ed.]

Tire Compound.

Editor HORSELESS AGE:

On page 324 of issue March 4, 1903, mention is made of Dr. Norwood's formula for glue and molasses tire compound. My Oldsmobile is fitted with single tube 28x2½ inch tires and I now have three tires that have been vulcanized and are not holding air. Will you please tell me how to prepare the formula, as I would like to get something to use in the three old tires so that I could get a little more mileage out of them? In case you know of anything better please pass it along.

ERNEST CARLEY.

[The proportions of glue and molasses are varied somewhat according to the condition of the tires and the season. Three pints of molasses to one pound of glue is ordinarily used, if the tires are in fairly good condition and the leaks small. The mixture is heated in a glue pot with water bath, and when fully liquefied is injected into the valve opening of the tire by means of a foot pump. Efforts are made to spread the mixture over the whole inner surface of the tire while it is still hot. One half pint of the mixture per tire would be suitable for the size you are using.—Ed.]

A motor cycle race for the Austrian championship was held at Prague, October 25, over a distance of 25 kilometres (15.6 miles). It was won by V. Vondrich, on a Laurin Klement, in 22:22 3/5.

NEW VEHICLES AND PARTS.

Oldsmobile Railway Inspection Car.

The Olds Motor Works are building a railway inspection car equipped with their regular 4½ horse power motor. The mo-



OLDSMOBILE RAILWAY INSPECTION CAR.

tor has been mounted on a suitable frame and equipped with four 20 inch pressed steel car wheels of very light construction. The axles and underframe are of cold rolled steel, with outer casings of No. 11 gauge steel tubing. The motor, which is the standard runabout engine of 4½ inches bore by 6 inches stroke, is fitted with the regular two speed ahead and one reverse transmission. The car will carry four people comfortably, and will ascend any grade, up to the point where traction fails, it is claimed. This machine will travel from 80 to 100 miles with one filling of the water and gasoline tanks, and will reach a speed, on ordinary levels, of 35 miles an hour.

The Wolverine Gasoline Touring Car.

The Reid Manufacturing Company, of Detroit, furnish us the following information about their new touring car:

This car is equipped with a 15 horse power twin cylinder horizontal motor arranged crosswise under the bonnet in front. The engine has a cylinder bore of 5.3-16 inches and a piston stroke of 5.7-16 inches, and will develop 17½ horse power on the brake at 700 revolutions per minute. The speed is, moreover, variable between 150 and 1,400 revolutions per minute. The motor is lubricated by an automatic oiler holding an oil supply of one-half gallon, which is ample for several weeks running. This



FIFTEEN HORSE POWER WOLVERINE TOURING CAR.

oilier is arranged on the dashboard and is provided with sight feeds. The cooling system comprises a 12 gallon water tank, 60 feet of radiator coil in front of the bonnet, and a rotary pump driven by a "two to one" gear directly off the main shaft. Jump spark ignition is used, the current being supplied by four large size dry cells. The ignition outfit includes double spark coils arranged in a neatly finished box. The carburetor is of an improved pattern which automatically maintains the proportion of the mixture, regardless of changes in speed of the motor. Each cylinder has a separate inlet pipe, and the two exhaust pipes connect to a single muffler beneath the body. The gasoline tank has a capacity of 12 gallons.

The transmission gear is of the sliding gear type, and gives three forward speeds and one reverse. It is enclosed in an oil tight case, and requires attention only once in three months. The transmission to the rear axle is by a shaft with universal joints and bevel gears. For the high speed the gear reduction from the engine shaft to the rear axle is three to one.

The main frame bars are $3 \times 1\frac{1}{2} \times \frac{1}{4}$ inches angle steel, and the frame is supported in the rear by full elliptic springs 36 inches long and 2 inches wide, oil tempered. The wheels, of the wood artillery pattern, are 30 inches in diameter and fitted with $3\frac{1}{2}$ inch Diamond clincher tires. The front axle consists of a 2 inch steel tube of quarter inch wall thickness. The rear axle is

$1\frac{1}{2}$ inch solid steel forging with a $2\frac{1}{4}$ inch forged casting. All the axle bearings are Timken roller bearing, and provisions are made for automatically oiling the rear axle bearings, the capacity of the supply provided being sufficient for several weeks. The wheel base is 82 inches and the tread standard.

The car is equipped with a wheel steering gear with brass shaft and a 15 inch Hussey pivoted hand wheel, which gives free access to the driver's seat. The body has all leather cushions, and will carry five or six grown persons; it is finished in dark automobile maroon. The speed is from 6 to 35 miles per hour. The power is controlled by a clutch pedal and a hand gear lever. The brake is operated by foot.

New Combination Gasoline-Electric Truck.

A gasoline motor driven truck with electric power transmission has recently been constructed by the Howard Automobile Company, of Yonkers, N. Y., for the General Electric Company, Schenectady, N. Y., and is now being operated by the latter concern.

The wheels are 36 inches in diameter and have 6 inch solid rubber tires, $2\frac{1}{2}$ inch axles and spindles equipped with roller bearings manufactured by the American Roller Bearings Company. The rear axles are driven by two of the General Electric Company's standard enclosed type truck

motors, one for each rear axle, directly connected through double reduction gearing, giving a load speed of 5 miles per hour, and an accelerated speed, light, of 9 to 10 miles per hour.

The engine is a standard four cylinder engine, with cylinders of $4\frac{1}{2}$ inch bore by 5 inch stroke. The engine shaft is extended, carrying the armature of the generator. In this case the engine is not provided with a governor, but is fitted with a throttle and a spark advancer, which are connected to a pedal conveniently located. This pedal when left in its neutral position allows the engine to just turn over. It is safe and feasible to move the electric controller to either the first forward or the first backing notch without stalling the engine, as the connection between dynamo and motor is very elastic and the vehicle starts without any jar. The speed is then increased either by accelerating the engine or by advancing the controller to the forward notches. There are two controller positions for reverse and four for forward motion.

A coil radiator is provided in front and a larger one in the rear, which combines the water tank, being constructed of flat vertical tubes. Forward of this rear radiator is placed an electrical fan with wiring leading from the generator. When the generator is operated a current from same drives the fan, forcing a powerful draft through radiator. The engine is equipped with jump spark ignition, and is started by throwing a switch in after being once set under way



COMBINATION GASOLINE-ELECTRIC TRUCK OF THE GENERAL ELECTRIC COMPANY.

The platform of the truck is 7 feet wide by 15 feet long, and is purposely made high to conform to the height of railroad car doors, to facilitate loading and unloading.

This motor, with a launch on board, recently made a trip from Morris Heights, N. Y., to New York city, covering most of the principal streets and attracting a great deal of attention.

This type of transmission is claimed to be ideal for city work, as the vehicle can be handled with much more surety than a positively geared machine. If the wheels should get into bad holes, the motor can be accelerated and the current turned on gradually, thus avoiding danger of stripping gears. The system also enables the driver to step up on going up an incline, which is hardly possible with a positively geared machine. The weight of the truck complete is 6,800 pounds. It is said to have negotiated some very good hills on high gear without resorting to low gear. No storage batteries are used in connection with this machine.

Boston Y. M. C. A. Lecture on Steam Cars.

The first lecture in the series to be given this winter under the auspices of the Boston Y. M. C. A. was delivered on Friday night, November 13, by Parker H. Kemble, and dealt with steam cars. Mr. Kemble traced the historical development of the steam road vehicle, both in this country and abroad, and then passed to a brief discussion of the general features of modern steam cars, winding up with a comparison of the different motive powers. Following are some brief abstracts from the last part of the lecture.

The weak point of a steam car, Mr. Kemble said, was and probably always would be the boiler. He did not use "weak" here in the sense of dangerous or defective, but as requiring the most attention and care. There are at present four different systems of boilers in use on motor cars: Fire tube boilers, water tube boilers, flash boilers and semi-flash boilers. The fire tube boiler, or tank boiler, Mr. Kemble said, might be regarded as the standard type of boiler, being used the world over for almost every purpose. The form at present used for automobiles was brought out by Mr. Stanley in 1897, and to the introduction of this form of fire tube boiler, combined with a practical liquid fuel burner, was due the enormous progress in light steam vehicles which has taken place since that date. The advantages of this type of boiler are the great reserve of power, owing to the amount of water contained, and steadiness of steaming, due to the same cause. Its disadvantages are the necessity of keeping constant watch of the water level and the considerable damage which may be done by neglecting to attend to this duty.

The semi-flash boiler is really a water tube boiler when not in action, and a flash boiler when the engine is drawing steam.



WHITE REAR AXLE CONSTRUCTION.

It occupies a position about midway between the two, and unlike most compromises has the advantages of both types, and very few of their faults. Its advantages are briefly that there is no water level requiring watching, and that no damage is done in case of low water. Its disadvantage is lack of reserve power, which is due to the fact that only a small amount of water is contained in the boiler.

Illustrations were then shown of a horizontal direct connected type of engine, as exemplified in the Stanley car, and of the compound engine as used in the White touring car. The latter type was stated to represent a decided step in advance, as it led to much greater steam economy. The lecturer then showed the original engine made by the Mason Regulator Company for Mr. Stanley's first carriage in 1897, and for comparison also the latest engines of the same type. It was noted as an interesting fact that while the first engine was horizontal, and this type was later abandoned in favor of vertical engines, Mr. Stanley had recently returned to the horizontal type.

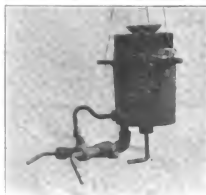
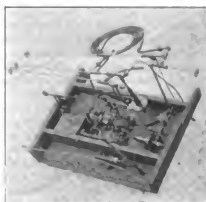
As regards bearings, probably roller

bearings on the axle carrying the heaviest load and ball bearings on the other axle would make a very satisfactory combination. Both roller and ball bearings will stand a degree of abuse and neglect, Mr. Kemble said, that would cause a plain bearing to stick. Leaf springs or carriage springs are the most popular at present. Tubular construction of frames will probably be abandoned, as a frame on the French system gives greater flexibility. In frame construction the possibilities of wood in connection with steel have by no means been exhausted. Three steering devices are in practical use—the wheel, the tiller and the side lever—and which one to use is largely a matter of personal taste. Where both hands can be used for steering, the wheel gives steadier control, but when one hand must frequently be removed to some distance from the steering device the wheel may become a source of danger, even if the mechanism comprises a non-reverse gear. The wheel should be applied to all but the lightest cars, as a matter of comfort, if not of safety.

Mr. Kemble then made a comparison of



TOP VIEW OF STANLEY CAR, WITH SEAT REMOVED.



PUMPS AND CONTROL MECHANISM, PILOT LIGHT.

the three motive powers, as to their respective advantages and disadvantages. The requirements of a motor car are: Reliability, ease of hauling, economy of maintenance, and last but not least, the ability to cover a considerable distance on one charge of supplies. As to reliability, Mr. Kemble thought the electric car leads, while the steam car comes next. A well built steam car well cared for will require no more than ten minutes to get up steam and everything ready to start off, and it will then run as long as there are any supplies left in the tank.

In point of ease of handling electricity is again in the lead, the electric car requiring only a single lever to give control of the power, and is free from noise and vibration. The steam car requires more work to get it ready for running. The fire has to be started, but that can be done while oiling; then the tanks have to be filled. While under way the driver has to watch at least two things, either the air and water or the steam and air, according to the type of carriage used, but the power is controlled with one lever, and the control is even more flexible than in the electric car. There is no noise and very little vibration.

As regards economy of maintenance, the electric car is probably the least economical, as the battery repairs are heavy. Steam and gasoline are about on a par. Steam cars use more gasoline, probably 5 gallons to the other's 3; on the other hand steamers use less lubricating oil by far. A steam car requires about the same amount of grooming that a gasoline single cylinder runabout does, but much less than a two or four cylinder car.

Repairs are on the whole rather less expensive with steam, as the parts liable to breakage are smaller and less expensive and the strains are more regular. Another advantage is the familiarity of any mechanic or machinist with repairing a steam engine. This, however, is only a temporary advantage, as familiarity with gas engines is but a matter of time.

In regard to ability to cover long distances without renewal of supplies electricity is last, with its range of 40 or 50 miles on the charge. Steam comes next with 30 miles for water and 60 or more for gasoline for runabouts, and 100 miles for touring cars. And gasoline heads the list with anywhere from 100 to 200 miles, according to tank capacity.

As regards keeping the machine moving steam has the advantage, as any trouble can be located at once and a piece of string and some heavy wire will do wonders, and a steam engine will almost always turn over and hobble home if not too badly demoralized.

For hill climbing on short hills steam has the advantage; on very long hills gasoline leads. Probably the majority of hills met with in touring would be handled easier by steam than gasoline.

In short the great advantage of steam lies in its exceptional flexibility and ease

of control, in the ability to immediately locate troubles and in its absence from noise and vibration.

As regards safety the naked flame of the steam carriage with modern arrangements seems more a theoretical than a practical danger.

Experience fleeting of the A. C. A.

The first evening session of the A. C. A. this season was held on Tuesday evening. November 10, with President Shattuck in the chair, and was devoted to the relation of the members' motoring experiences the past summer. President Shattuck called on Mr. Scarritt to open the discussion. The latter responded, and after some preliminary general remarks went at some length into accounts of two extended trips he had participated in in the past season—the trip of the Dill party into the Maine woods and the more recent Automobile Club run from New York to Boston and back. In connection with the Dill tour he told of an episode which has not before been mentioned in *THE HORSELESS AGE*. Mr. Dill arrived one evening in a Maine town and there met a man with a gasoline touring car, who challenged him to a race to a station about 20 miles away over a sandy road. The next morning the start was made, and the party with the gasoline car drew ahead and constantly gained in the lead. After having been outdistanced considerably Mr. Dill stopped at a drug store to purchase some alcohol, which he put into his water tank. As the boiling temperature of alcohol is much below that of water, the steam pressure immediately rose above the normal and with the increased power thus obtained and by taking a detour over roads less sandy, Mr. Dill succeeded in beating his rival into the town.

Mr. Scarritt also referred to the recent New York-Pittsburg Endurance Contest and said that in thinking over the awful difficulties encountered the wish arose in him that he had been an observer in the contest, just to see whether he possessed the same Anglo-Saxon stamina that was shown by so many of the contestants. He said that congratulations were due to all the contestants and to the automobile world in general, and that the latter owed the contestants a debt of gratitude.

A. L. Riker, the only contestant in the run who was present, was then called upon to give an account of his experience, which he did. Mr. Riker described at length both the outward journey to Pittsburg during the actual contest and his return over the same route later on. During the outward journey he had three more or less serious mishaps, the reverse gear breaking twice and once the rear axle was bent. After the first extended delay he drove 235 miles in seventeen and one-half hours. The bending of the rear axle occurred near Painesville, Ohio, where the rear wheels dropped into a deep chuck hole in the road,

which proved too great a strain on the axle. The latter was straightened out again at Cleveland. The run from New York to Pittsburg and back to Buffalo was made without tire troubles, but during the remainder of the return journey several delays were caused by the tires; a spring was broken near Kingston.

S. A. Miles and C. H. Gillette also spoke briefly on the Endurance Contest, the latter calling particular attention to the enormous difficulties encountered by the belated contestants, owing to the floods and washouts. At many stations the official observers were near collapse, most of them being unused to being outside in inclement weather. At Binghamton one of the drivers, described as a happy go lucky sort of fellow, when arriving said that he felt just like a wet sponge and would go to the hotel to wring out.

Mr. Chapin asked why canopy tops and glass fronts were not used, as at least some bad weather might have been expected during the run, to which it was replied that glass fronts are very objectionable during a rain, as they rapidly cover with fog and prevent a free view ahead. The additional wind resistance is also a factor against them in a contest.

President Shattuck then gave a brief account of his 4,000 miles tour in Europe last summer in an 18 horse power Limousine car. Three trunks, of wicker work, as well as three outer tire covers and eight or ten inner tubes, were very conveniently carried on the roof of the Limousine body. He found this type of body very comfortable for touring purposes, as it entirely obviated the dust nuisance, gave protection in wind and rain, and afforded ample room for storing touring necessities. The body was built of wood, instead of aluminum, and the car was therefore rather heavy—3,200 pounds—but as the roads were practically always good, the power was quite ample. The only objectionable feature of the car was its top heaviness, and extreme care had to be exercised in turning corners. In such cases the flexion of the inner and outer springs under the centrifugal force could be very distinctly felt, but the car was in charge of a careful driver and no accident of any kind occurred. Mr. Shattuck thought, however, that owing to our poor roads the Limousine type of body would be unsuitable for touring in this country. He also said he noticed that tire troubles are relatively more frequent in Europe than in this country, which he ascribed to the fact that the peasants over there wear tacks in their shoe soles which are lost and scattered over the roads with the "business end" up and are frequently picked up by the tires. The nail extractors, or "arrache clous," used on many French cars, he thought to be of real service, as they would generally dispose of a nail or tack picked up before it had done any real harm. It was impossible to use these nail extractors on the front wheels, owing to the fact that the wheels turn in steering, but he had found it a good

practice to suspend a small chain from the mud guard, dragging on the surface of the tire. When a nail is picked up it strikes the chain and throws it against the metal fender, thus giving a warning click which the trained ear will generally discern.

M. C. Krarup then gave a brief account of a trip across the continent from San Francisco to New York, which he accomplished in company with E. T. Fetch in a Packard car last summer.

New Incorporations.

Paterson Automobile Storage and Exchange Company, 107 Broadway, Paterson, N. J.—Capital stock, \$25,000; Jacob Vanderclock, manager.

Hasbrouck Motor Works, Groton, Conn.—Capital stock, \$75,000. To build boats, and marine, vehicle and stationary motors.

Ford Automobile Company, St. Louis, Mo.—Incorporators, Jordan W. Lambert, Lewis Spindler and Samuel B. McPheeters, all of St. Louis. To manufacture and deal in automobiles, etc. Capital stock, full paid, \$2,000.

Consolidated Manufacturing Company, of Toledo, Ohio, incorporated in Arizona.—Capital stock, \$600,000. Combination of Kirk Manufacturing Company and Snell Cycle Fittings Company. Admitted to do business in Ohio. Officers, E. F. Breckenridge, president; S. W. Colton, secretary, and J. R. B. Ransom, treasurer.

Four Wheel Drive Wagon Company.—Capital stock, \$1,000,000. Incorporators, H. Theodore Hansen, Lyman G. Wheeler and Charles B. Perry, of Milwaukee, Wis. A factory is projected at Milwaukee for the manufacture of motor trucks with four wheel drive.

It has been determined by the Moto Cycle Club of France, in connection with their 1,000 Kilometres Reliability Trial, that the second category for two seated motor bicycles is cancelled. Also that each manufacturer can only enter two machines in the same series, and that the "team" cup be also withdrawn, in consequence of entries of teams of three machines not being allowed.

Club Notes.



Pittsburg A. C. Club Run.

The Automobile Club of Pittsburg held a club run to Butler, Pa., and back on Saturday, November 7, last, the first run of the kind ever undertaken by the club. Although the day was extremely cold and the roads exceedingly bad, twenty-two cars of the twenty-nine entered started. The start was made from the Hotel Schenley at 8:30 a. m. The distance to Butler is 42 miles, so that the round trip constituted a day's journey of considerable length. The route followed on the outward journey is the so called "Three Degree road" (probably because the tortures of traveling on it are suggestive of the third degree in criminal proceedings). Some portions of this road are exceedingly rocky, as shown by one of our illustrations, and at other parts deep ruts are cut into the road surface, which on this occasion were partly filled with frozen mud. The procession was led by Thomas Hartley, whose car was known as the Pathfinder. He carried with him a bag of confetti, by which the road was marked. This car reached Butler at ten minutes after 11, and the next car got in about half an hour later. At Butler the club members to the number of about sixty enjoyed a dinner at the Hotel Willard, and the return journey was started upon at 1:30 p. m. The return trip led over the Butler plank road and Flinn road, and was much more pleasant than the outward journey. Some of the cars indulged in rather high speeds, and in later club runs the Pittsburg A. C. will probably find it necessary to appoint a marshal.

All of the twenty-two machines which started arrived back in Pittsburg at the Banker Brothers' garage, where the run was concluded, in good time. There were few mechanical mishaps, but the occupants of one of the cars met with a rather ex-

citing incident, which might have proved fatal. While William Graff, one of the participants, was driving along the Butler plank road, 8 miles from Etna, at a fair speed, he and the other occupant of his car, William R. Goettmann, were shot at by a gang of young hoodlums about 50 yards away in the field, with Flobert rifles. Two bullets went through Mr. Graff's cap and grazed his head. The boys escaped in the woods, but efforts will be made by the club to apprehend them. The committee in charge of the run consisted of W. L. Elkins, chairman; Thomas R. Hartley and George L. Hailman.

A. C. A. Election.

The election of officers of the Automobile Club of America took place at the club rooms, 753 Fifth avenue, New York, on Monday afternoon, November 16. The regular ticket was elected, as follows: Winthrop E. Scarritt, president; Henry Rogers Winthrop, first vice president; Harry Paine Whitney, second vice president; Wm. K. Vanderbilt, third vice president; Jefferson Seligman, treasurer; Dave H. Morris, Sidney Dillon Ripley and Albert R. Shattuck, governors to serve three years (1906 class); Harlan W. Whipple and Arthur Iselin, governors to serve one year (class of 1904). Reports of the standing committees were read and approved. A vote of thanks was tendered retiring president Shattuck.

Eagle Rock Hill Climbing Contest.

The Automobile Club of New Jersey will hold its annual hill climbing contest on the Eagle Rock Hill, West Orange, N. J., on Thanksgiving Day, beginning at 10 a. m. sharp. The events will include the following: Open steam event; open electric; open gasoline; gasoline under \$1,000 list price; gasoline, \$1,000 to \$1,800; gasoline, \$1,800 to \$3,000; gasoline, over \$3,000. The Mors timing instrument of the A. C. A. will be used. We are informed that the entries so far have been very gratifying, ranging



STRETCH OF ROCKY AND HILLY ROAD.



INVESTIGATING A CASE OF DEFECTIVE BOILER FEED.



EAGLE ROCK HILL, WEST ORANGE, N. J.

from Oldsmobile to Mercedes. A total number of entries of thirty is expected. Entries should be addressed to C. H. Gillette, secretary, 31 West Forty-second street, New York city.

CHICAGO A. C.

The annual election of officers of the Chicago Automobile Club was held last week at the annual club meeting, and John Farson was chosen president for the ensuing year. Other officers elected were: First vice president, Dr. F. C. Greene; second vice president, W. G. Lloyd; secretary, J. W. Duntley; treasurer, James A. Charter; directors, Charles W. Gray, T. J. Hyman, B. H. Marshall, J. R. Markle, J. A. Ellis, H. E. Thomas and Ira M. Cobe. President Charles Gray and Secretary Tarrant both refused to allow their names to be used as candidates for re-election. An opposition ticket was in the field.

N. J. A. AND M. C.

A meeting of the officers and board of governors of the recently organized New Jersey Automobile and Motor Club was held in Newark last week. President B. M. Shanley, Jr., presiding. C. W. Baker, who was elected a member of the board of governors at the meeting of October 15, sent in his resignation. This was accepted and Dr. James R. English was elected in his stead. Seven new members were elected—L. H. Staehle, S. F. Bailey, C. L. Ingraham, William De Mars, George Rahmann, Dr. Clement Morris and Dr. G. Carleton Brown. Committees were appointed as follows: Membership—J. H. Dawson, W. V. Snyder, Jr., and William De Mars. House—Jacob W. Mason, E. W. Adams, Dr. S. E. Robertson, B. S. Whitehead and Dr. Clement Morris. Legal—Dr. H. C.

Harris, Dr. James R. English and J. H. Wood. Auditing—Daniel Pierson, Jr., R. C. Jenkinson and L. L. Staehle. The committees were elected for one year from May, 1903. Dr. Harris was appointed to draw up a circular letter, to be sent to automobilists all over the State, setting forth the advantages of membership in the club and laying particular stress on the legal protection the club affords its members.

N. A. A. M. Matters.

At the last meeting of the executive committee the Holley Motor Company, Bradford, Pa., was elected to active membership, and the National Carbon Company, Cleveland, Ohio, and Rose Manufacturing Company, Philadelphia, Pa., to associate membership. The resignation of *Automobile Topics* from associate membership was accepted. A. B. Tucker was elected secretary in place of Harry Unwin, who recently retired.

The management of the St. Louis Exposition has placed the allotment of space in the automobile section in the hands of the association. The executive committee has asked all members who have applied for space to join in one comprehensive American exhibit, and has made an appropriation of \$5,000 toward the expenses. Practically all of the makers who applied for space are said to have agreed to the plan, and space has been secured in the Transportation Building.

One of the advantages of membership is shown in the allotment of space at the New York and Chicago shows. The association arranged that members should be served before others.

A printed letter regarding the incorporation of the association is being sent to members.

Decisions by the A. A. A. Racing Board in Connection with the Brighton Beach Race Meet.

The protest of F. A. La Roche against the Georges Richard-Brazier car, entered in event No. 1 by E. B. Gallaher, on the ground that it failed to conform to Rule 13, in not being provided with "body and hood sufficient to cover the mechanism," was allowed by the referee and the Richard-Brazier car disqualified. Mr. Gallaher appealed to the racing board from the decision of the referee. The racing board sustained the decision of the referee.

The protest of E. B. Gallaher against the Darraq car, No. 35, driven by F. A. La Roche, in various events at the Brighton Beach race track, on Saturday, October 21, is not sustained.

The application of the judges for permission to reverse their placing of the cars in event No. 9, the Brighton handicap, owing to the race having been finished after dark, the correct order of finish being as follows: First, No. 4, Winton; second, No. 24, Renault; third, No. 35, Darraq; fourth, No. 19, Cadillac.

Those Dreaded Numbers.

The English Local Government Board has just fixed the size of number plates to be carried by motorists under the new law. Plates must be black and the letters and figures on them white. The letter or letters of the council must be placed over the figures. The letters must be not less than half an inch below the upper side of the plate. The bottoms of the letters must be at least an inch above the tops of the figures. The letters and figures must be 4 inches high, an average width of 3 inches and of a uniform thickness of 1 inch, with a space of not less than half an inch between each letter or figure. No letter, design or figure or other mark may be placed upon the plate, nor on the car within a foot of the plate.

The Horse Beaten at Ploughing.

At the Chislet Agricultural Association's annual ploughing competition near Canterbury, the Ivel agricultural motor defeated all ploughs drawn by horses. The motor hauled a three furrow plough over the ground with ease and accuracy, and afterward proved that it could plough a field of 6 acres in eight hours at a cost of 5s. per acre, thus not only saving time but doing the thing 100 per cent. cheaper than horse drawn ploughs.—*London Daily Express*.

Trade Literature Received.

H. F. Borbein & Co., St. Louis.—Circular of Brecht light touring car.

The Bullock-Beresford Manufacturing Company, Cleveland, Ohio.—Circulars of the Bullock igniter.

Sandusky Automobile Company, Sandusky, Ohio.—Advance booklet of the Sandusky 1904 gasoline automobile.



Davenport, Iowa, is to have an automobile club.

Frank Palmer is opening an auto store at Battle Creek, Mich.

F. E. Avery, Columbus, Ohio, is building an annex to his garage, 60x85 feet.

The Clark Manufacturing Company are establishing a garage at Moline, Ill.

The Clarkmobile Company, Lansing, Mich., have moved to Michigan avenue East.

The American Veneer Company have moved their factory from Jersey City to New Orange, N. J.

Dallas and Waco, Tex., city fathers are endeavoring to foist on the city a 6 mile limit for automobiles.

The newly organized Richmond-Jarvis-Caro Company, Grand Rapids, Mich., have secured the Ford agency.

The Fred T. Merrill Company, Spokane, Wash., will install an auto livery, including a "Seeing Spokane" auto service.

P. H. Pelkey & Co., of Winfield, Kan., have leased property on South Lawrence avenue, Wichita, and will open a garage.

The Pence Automobile Company are erecting the first special auto building in Minneapolis, at 717 and 719 Hennepin avenue.

The Cushman Motor Company, Lincoln, Neb., are planning to start branch factories in Racine, Wis., and at other points East and West.

A movement is on foot to form an automobile club at Montreal, Canada, with the chief object of improving the roads of the Province of Quebec.

The Boston Automobile Exchange has just completed the installation of an electric charging plant, giving the station a No. 1 rating instead of No. 2, as heretofore.

Homestead, Pa., business men are talking of establishing an auto express between that town and Pittsburg, and have ordered a steam truck of Groust Brothers, Orange, Mass.

F. A. La Roche, the New York racing enthusiast, has placed an order with Darracq & Co. for a 180 horse power racer, equipped with two 90 horse power motors, one over each axle, and having other new features designed by Mr. La Roche.

E. T. Birdsall, manager of the Standard Automobile Company, of New York, importers of Decauville machines, has leased the garage in West Thirty-ninth street, occupied at present by the Smith & Mortensen Company, which will be used as a storage and repair department for Decauvilles.

The Princeton Automobile Club, the members of which are undergraduates of Princeton University, was recently organized. The officers are: President, John Hays Reed, Jr., '05, of Pittsburg, Pa.; vice

president, Childs Frick, '05, of Pittsburg, Pa.; secretary and treasurer, Singleton H. Bird, '06, of New York.

An automobile club is on the tapis at New Haven, Conn.

J. W. Skene will open a garage on Park street, Lewiston, Me.

Herbert D. Ticknor, Rockford, Ill., has secured the Ford agency and will open a garage.

Wilson & Co., Ottawa, Canada, have added a storage and repair station to their establishment.

John C. Haynes will build an automobile station on Ferdinand and Winchester streets, South End, Boston.

G. S. Noonan (brass founder), Rome, N. Y., is now making a specialty of brass and aluminum license numbers.

James A. Hands has resigned the management of the Pioneer Automobile and Campus Motor Company, 523 Fifth avenue, New York.

The Hodge Iron Company, Houghton, Mich., are about to place on the market an 8 horse power gasoline machine, with four speeds and bevel drive and listing at \$750.

H. F. Borbein & Co., St. Louis, Mo., successors to the Brecht Automobile Company, are building a 12 passenger motor stage for W. J. Hicks, Flat River, Mo., as well as several large touring cars ready for power.

W. J. Swan has organized a company at Middletown, Conn., to build a single cylinder gasoline runabout selling at \$450. The motor, 5 horse power vertical air cooled, is in front. Other features are wheel steering, wood wheels and direct shaft drive. The incorporation will take place December 1.

A. O. Abbott, formerly connected with the Cadillac Automobile Company, Detroit, Mich., has been appointed general manager of the Reliance Automobile Company, a new concern just organized there with ample backing to manufacture gasoline automobiles.

According to a report two electric mail wagons were placed in service by the postal authorities in Philadelphia on November 1 for transporting the mails from the post office to the railroad depots and vice versa. These wagons are of the fore carriage type and have six wheels, according to an illustration in a local paper.

The Hoffman Automobile and Manufacturing Company, Cleveland, Ohio, has changed its name to the Royal Motor Car Company, and will bring out a new machine for 1904, called the Royal Tourist, and including two models, a 16 horse power double cylinder car and a 35 horse power four cylinder car, both with vertical motors in front.

George I. Warren, an aged machinist of Paterson, N. J., has constructed for himself an automobile out of two ladies' bicycles and a 3x3 inch single cylinder gasoline motor. It is not a thing of beauty, but it is said to mot. Mr. Warren is an invalid and we hope that in addition to the satisfaction of seeing the product of his handicraft operate as intended he may have the

pleasure of enjoying many a refreshing ride in it.

We have received a pamphlet containing a reprint of a paper on "Good Roads—Their Importance to the Community." By J. Ewing Mears, M. D. Read before the Solebury (England) Farmers' Club on October 3.

The Locomobile Company report the following recent sales of their gasoline touring cars: C. T. Willis, Greenwich, N. Y.; Dudley Aldrich, New York city; C. A. Kingsley, Hartford, Conn.; Samuel Powell, Newport, R. I., and George Jacques, Chicago, Ill.

The New Hampshire Automobile Club has been incorporated at Exeter, N. H., with the following officers: Reginald C. Stevenson, president; Arthur H. Sawyer, vice president; William M. Jenkins, treasurer; Charles G. Sheldon, secretary, the foregoing all of Exeter, and Mr. Powers, of Somerville.

H. G. Martin & Co., Providence, are making extensive improvements in their garage, including an electric charging plant for twelve carriages, reading and smoking rooms and chauffeurs' quarters. When complete it will be one of the best equipped stations in New England, with storage accommodation for 140 cars and a machine and repair shop 60x75 feet.

Geo. W. Reed, of Boston, who has lately returned from a tour of Germany, Switzerland and France in a Knox automobile, has made a unique record. We are informed that he left Boston with his Diamond tires well pumped up with good Atlantic sea-board air, and he has returned from Europe, bringing back in every tire the air with which they started.

Philadelphia dailies of last week relate the tale of a Quixotic chauffeur who declined to obey the rules in regard to stopping the motor and would not wait for a Pennsylvania ferryboat on which he was crossing to Camden to make its landing and the gates to be raised, but dashed through them at top speed, smashing them open and apparently doing little damage to his big touring car. The police are on the lookout for him.

A second automobile show for New York, to be held January 16 to 30, in the Herald Square Exhibition Hall, top floor of the Macy Building, is announced. The management states that it desires to afford those who were unable to get space at the Madison Square Garden an opportunity to show their products. Sixty-nine spaces have been laid off and some already spoken for we understand.

The Olds Motor Works state that they will open a branch store in Boston in the premises formerly occupied by H. B. Shattuck & Son, who recently failed, and under the management of Benjamin Smith, recently with H. B. Shattuck & Son, and well known to the New England trade. Mr. Smith will handle the entire New England territory with increased facilities, including a garage in the rear of the store on Stanhope street.

Developments in Automobile Construction.*

ENGINE VALVES.

Various forms of valve for the distribution of steam to the cylinder have been tried under the special conditions pertaining to automobile service, including those of the piston, mushroom and slide types, both balanced and unbalanced. The type of valve which I have found to give the best results is the slide valve of circular instead of the ordinary rectangular form. The usual locomotive practice of connecting the valve to the valve rod by an encircling yoke has been adopted, and in the case of the circular sliding valve this forms an exceedingly simple construction, permitting the valves to rotate and so equalize wear, obviating perhaps what is the greatest trouble of the sliding valve, viz., the tendency to score and wear in grooves, especially at the ends of the steam ports. The effect of making the valve circular and permitting it to rotate is very remarkable, the surface of the valve burningish up like a mirror, and producing a similar surface on the port face of the cylinder, although this, of course, does not revolve. Another important feature in this connection is that the valves are placed beneath the cylinders, which are horizontal, and in this way allow the water of condensation to automatically drain from the cylinders when starting without necessitating the use of drain cocks or relief valves.

FEED PUMPS.

Another important detail is the proper construction of pumps used for feeding the boiler, and for pumping the fuel and lubricating oil, as well as returning the water of condensation from the hotwell back to the tank for use again. One standard form of interchangeable pump and valve box has been devised, as a result of experience with many forms, the valves being in the form of flat disks, with about one-thirty-second inch lift, and the whole of the valve box, including both suction and delivery, is conveniently got at by slackening a single screw. This form of valve box I have found to work extremely well at very high speeds, even as high as 900 double strokes, or 1,800 single strokes per minute, and so long as dirt is excluded by fitting a strainer on to the suction side, I have never found them to fail, or even to need grinding. The valves are not ground originally, but fitted to the valve box directly as they leave the machine.

PUMP PLUNGER PACKING.

Another important detail in pump construction is in dispensing with the ordinary form of stuffing box, the use of which, as already mentioned, requires certain experience and judgment, otherwise leakage takes place around the plunger through defective packing, or the friction on the plunger is greatly increased by screwing the packing too tight. In place of the ordinary

packing I have substituted a solid ring made on the hydraulic principle, which may be conveniently slipped over the plunger, and requires no attention for adjustment. When the plunger begins to show signs of leakage the ring may be replaced with a new one in a few minutes. The rings are made accurately to gauge, and will run for 1,000 miles without renewing. In this connection it is important that the plunger be of suitably hard material and accurately machined, as any irregularities or roughness of its surface would soon injure the packing; also the avoidance of all lateral strain or movement is desirable, and for this purpose I have found a gall joint on the connection, between the plunger and its operating eccentric, to give the best results.

LUBRICATION.

One of the most important details affecting the engine is the provision of automatic lubrication to every bearing. It is necessary to divide the lubrication into systems. First, dealing with the internal lubrication of piston and valves, which are in contact with the steam—these require a special grade of cylinder oil—and an independent system dealing with the other bearings of the engine, such as slides, journals and valve motions, which are not exposed to the direct action of the steam. This may be classed as external lubrication. The life of the machinery and its general efficiency is largely governed by the effectiveness of lubrication, and I therefore call special attention to the means of securing the most reliable lubrication with the smallest attention on the part of the driver. Forms of lubricators, or devices for feeding the lubricant to the working surfaces, are simply innumerable. Much ingenuity has been displayed in their construction, with the object of securing a regular feed and avoiding stoppages, which would speedily have disastrous consequences.

LUBRICATORS.

A lubricator consists of a reservoir and one or more feeders. It may be portable, as in the old fashioned oil can, which is perhaps the most elementary form of lubricator. Usually the lubricator is fixed close to the bearer it is to serve, or, should this be inaccessible, it may be fixed at a distance, and a connecting pipe used. The use of an oil can is extremely wasteful in lubricant, and should the interval between the successive feedings be too long, permanent injury to the bearings is likely to result. The same general conclusion applies to all devices which depend for their action upon human adjustment and attention, and I have no hesitation in affirming that to expect a driver to regularly fill and periodically inspect and adjust a lot of lubricators in a car is highly unreasonable. Even with a careful driver, some may be overlooked—or in the act of filling, foreign substances may get in—besides, the filling operation is messy and disagreeable, and therefore likely to be postponed unduly. In preparing a car for

service, attention to lubricators forms no small part, and could this be entirely done away with, the time would be shortened and the pleasure of using a motor greatly increased.

SYSTEMS OF LUBRICATION.

Speaking broadly, there are two systems of lubricating a bearing. In the first the rate of feeding is adjusted as far as practicable to the actual requirements. In the second the bearing is liberally flooded and the large surplus recovered for use again. It would not serve my purpose to attempt to describe the innumerable forms of lubricators which come under the first category, all of which depend individually for their action upon human adjustment, since I am entirely opposed to such human adjustment and individual inspection. The long rows of sight feed dips which are sometimes seen on a dashboard are veritable instruments of torture, and it is perfectly unreasonable to expect the driver to look at them. With such an instrument the poor driver is between Scylla and Charybdis—either he must largely overfeed, or risk a stoppage and a ruined bearing.

The quantity of good oil necessary to maintain a film between the working faces of a well constructed bearing is very small indeed. To approximate the rate of feed to this small quantity means a very small drip outlet, and a very small drip outlet means that a tiny particle of dirt or extra thick oil will stop the supply altogether. To avoid this the feed is habitually extravagant, and the cost for wasted lubricating oil may easily be ten or more times of what is actually used. The system of liberally flooding the bearings, and recovering the surplus implies that all the bearings are effectively enclosed, not merely to exclude dust—which is a good thing in itself—but to catch the surplus oil and collect it in a common reservoir.

SPLASH AND FORCE FEED.

The oil may be supplied to the bearings either by the splashing of the mechanism in a bath of oil or the oil may be pumped over the bearings. Both ways have the advantage of starting and stopping the lubrication simultaneously with the running of the machinery and without the intervention of the driver, which is a correct principle. The waste of oil is extremely small—if the case is properly made—and consequently the best quality does not become an expensive item when one gallon will last for 1,000 miles. Splash lubrication answers well in some cases where all of the bearings are in a position to benefit by the splash distribution; but this is not always the case and the violent agitation of the body of oil tends to preserve in suspension any fine solid particles either of dirt or metal which should be allowed to settle. For the above reasons I advocate pumping the oil under pressure. A force pump working under the extremely favorable conditions of dealing with lubricating oil will run for

* Paper read by T. Clarkson before Section G of the British Association.

years without attention and its action may be instantly tested at any time when running by momentarily pressing a button.

EQUALIZED FEED.

The next step is to insure that the oil which is pumped is going to all of the bearings. On an automobile I do not advocate a separate pump for each bearing—one pump for all the bearings is enough—only we must be sure they all get a proper share. One arrangement is for the pump to deliver the oil into a distributing main fitted with branch pipes, which connect with the several bearings. The objection to this is that some of the branch pipes may become fouled after prolonged use, and the rest of the branches will obligingly take their brothers' share. Or, if some of the branch pipes are longer than others—which is practically inevitable—the short ones take more oil than the longer ones. This means that the circulation in the larger pipes is less vigorous, and this is the first step to becoming sluggish and finally stopping altogether. Such an attempt at equal sharing or commutation must fail, and I can only see one effectual remedy for it—namely, to compel each of the branch tubes in turn to take the whole of the oil delivery for a fraction of the time, instead of attempting to take a fraction of the delivery all the time. From this conclusion—which, it will be noted, professes nothing more than ordinary common sense—it is a short step to construct such a distributor.

A SPECIAL DISTRIBUTOR.

In a distributor which I have found to answer perfectly and give no trouble, the oil is delivered by the pump into a pipe, and fills a box, from which the only outlets are a ring of holes, each of which communicates with a bearing. This ring of holes is covered by a circular disk, which is slowly revolved by the motor. On one side of the disk a segment is cut out, so as to uncover one hole at a time, and the desired result is accomplished. Care is to be taken to make the segment wide enough to partially open the next hole before closing the last. Any number of branches may be used. The arrangement works perfectly; it has never given the slightest trouble since it was made. After running over 3,000 miles a Chelmsford engine fitted with it was taken to pieces and examined. The surfaces were found in perfect condition, and there was practically no wear; the engine was as good as new, and would certainly run a distance equal to the circumference of the earth before needing repair. The consumption of lubricating oil is very small, and the relief from attention to indicators has added a great charm to driving. The oil is strained each time it circulates, and any solid particles are permitted to quietly settle to the bottom of the oil well, where they can do no harm. A drain tap is provided at the lowest point, and replenishing is done through a

large inspection hole in the top of motor case. It is not necessary to carry a reserve of lubricating oil, or even an oil can, except for steering and brake motions. One filling of the well—say a gallon—will last quite 1,000 miles on a large car.

LUBRICATION ON CONDENSING CARS.

Secondly, with regard to cylinder lubrication. As the long distance steam car is required to recover the water of condensation for use again, and as it is desirable to have this water as pure and free from grease as possible, the less oil that is used in the cylinders the easier will separation become. Owing to the intermittent character of the service of pleasure cars, and to their remaining out of commission for days at a time, during which cylinders and valves might corrode, it has not been found practicable to dispense altogether with cylinder lubrication, or to trust altogether to graphite, a film of oil being necessary to preserve the surfaces against oxidation.

(To be continued.)

Legislative and Legal.

Santa Rosa, Cal., has adopted a 20 mile limit.

Eight, 15 and 25 miles will probably be the speed limits at Minneapolis.

The new auto ordinance of Los Angeles, Cal., reduces the size of the letters required from 5 inches to half that size, makes numbering compulsory and makes the maximum penalty for violation a fine of \$100, or imprisonment for fifteen days, or both.

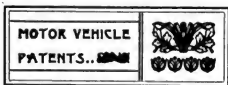
A. C. Banker, a Chicago automobile dealer who secured an injunction against the city restraining the authorities from prosecuting him for failing to comply with the new automobile license law, has lost his case on appeal, and the injunction is dissolved.

The New Packard Works.

The new Detroit works of the Packard Motor Car Company are laid out in a hollow square, 400 feet on each side, all the outside buildings being intended for construction purposes, and the buildings in the centre for finishing. The works consist of the main building (No. 1), on the east, with north and south wings, and buildings No. 2, 3 and 4, independent from the main building.

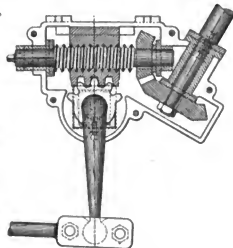
The only entrance to the plant is between the south wing and building No. 4, the office building, with the general sales offices on the second floor and the manufacturing offices on the first floor, being located in the extreme west. Next to the office section comes wash room for 300 men, a wash sink and clothes locker being provided for each man. The remainder of the south wing is taken up by the lathe department.

The first floor south half of the east wing contains the screw machines and drill presses. At the north end of this department is the tool crib or storeroom for carrying all factory tools.



United States Patents.

743,357. Steering Gear for Vehicles.—Arthur L. Waugh, of Cambridge, Mass. November 3, 1903. Filed February 9, 1903.

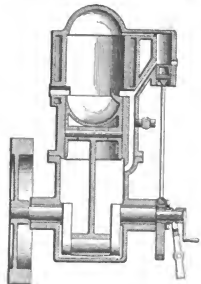


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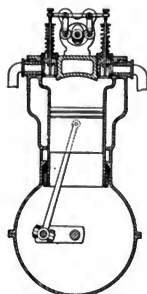
The invention consists of a casing, in two parts, a steering rod and a rotary screw, both journaled in said casing, bevel gears rotatably connecting said rod and screw, a nut having screw threaded engagement with said screw, and specific means by which the nut is prevented from rotating.

743,327. Ignition Device for Explosive Engines.—Wolcott Remington, of Stamford, Conn. November 3, 1903. Filed May 9, 1902.

This patent relates to means for igniting the explosive charges by means of a compression of an explosive mixture to its explosion point in a cylinder auxiliary to the main working cylinder, but having com-



No. 743,327.



No. 742,970.

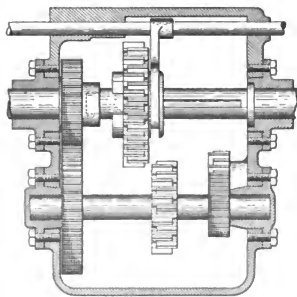
munication therewith, and a means whereby the explosions can be timed and regulated by varying the lead of the auxiliary piston and whereby the auxiliary piston can be driven independently of the main piston, if necessary.

As will be seen from the drawing, the igniting device is intended for use on a two cycle engine, and from the passage connecting the crank chamber and combustion chamber a branch passage leads off to the auxiliary or igniting cylinder. The object of making the auxiliary piston detachable from the main piston is to permit starting large motors by compressing in the auxiliary cylinder only.

743,067. Reducing and Backing Gearing.—George F. Evans, Newton, Mass. November 3, 1903. Filed March 23, 1903.

743,116. Automobile Roadbed.—Randall T. Van Valkenburg, Laporte, Ind. November 3, 1903. Filed July 13, 1903.

743,156. Variable Speed and Reversing Mechanism.—Fay O. Farwell, Dubuque, Ia. November 3, 1903. Filed July 22, 1903.



No. 742,812.

743,309. Resilient Core and Tire.—Charles Miller, Binghamton, N. Y. November 3, 1903. Filed February 11, 1903.

742,970. Petrol Motor.—Adolphe Clement, of Levallois-Perret, France. November 3, 1903. Filed October 9, 1902.

The cylinders are of cast iron, and are externally water jacketed. The valve chests are arranged in the cylinder heads. The cylinders are smooth on the outside, so that they may be cast in one piece.

The upper half of the crank case, which usually serves as framework or support for the cylinders, is bolted to a base and is continued upwardly so as to form a jacket for the cylinder. This jacket is round if there is only one cylinder and oblong if the motor has more than one cylinder. A restricted portion of the jacket resting against the cylinder serves to centre the cylinders. A tight joint between the cylinder and jacket is secured above by means of a collar cast upon the cylinder and below by means of a packing collar and nut.

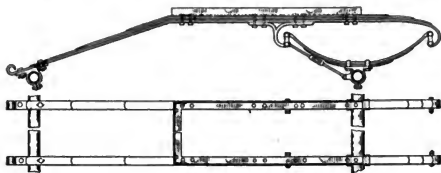
abutment for the teeth, which has no tendency whatever to slip or to force the gear sidewise, but which serves to cause them to slide easily and noiselessly to mesh one with the other, as has been demonstrated by the operation of this invention in connection with motor carriages.

742,820. Gas Engine.—Edwin E. Arnold, Pittsburg, and Alexander T. Kasley, Wilkensburg, Pa. November 3, 1903. Filed January 16, 1901.

742,831. Pneumatic Tire.—John R. Brunt and Richard C. Pitt, Christchurch, New Zealand. November 3, 1903. Filed April 9, 1902.

743,402. Vehicle Spring.—Frederick L. Smith, of Detroit, Mich. November 3, 1903. Filed July 28, 1903.

The patent is assigned to the Olds Motor Works, and covers the combination of side springs with semi-elliptic springs in the rear. It is stated in the specification that while simple side springs are well adapted for light vehicles, they are not suitable for



No. 743,402.

The packing also serves as a cushion to allow for difference in the expansion of the cylinder and jacket. The cylinder is perfectly homogeneous, as it is cast without a core, and as it is turned both inside and out, no deformation in the circumferential direction can be produced.

742,812. Gearing.—Alexander Winton, of Cleveland, Ohio. October 27, 1903. Filed June 13, 1902.

Relates to a sliding gear, and provides improvements whereby the gears can be readily brought into mesh with each other. The improvement consists in cutting away a part of every other tooth of the gear at that side of the teeth with which it is desired to engage the gear. If it is desired to have the gear engage from both sides or directions, then the ends of every other tooth of the gear at both sides thereof are cut away. The overlapping teeth of one gear will then pass between two overlapping teeth of the adjacent gear, which provides a clearance equal to the space between two teeth, affording a square, positive or straight

heavier cars, and the object of this invention is to reinforce the rear spring arms, which carry the greater part of the load. Besides it would seem that chain struts or distance rods can be used to greater advantage with this form of spring construction.

742,856. Battery.—James W. Gladstone, West Orange, N. J. November 3, 1903. Filed September 17, 1903.

743,332. Explosive Engine.—Middleton H. Roberts, Rolf, Ia. November 3, 1903. Filed August 17, 1901.

743,337. Battery.—Georges Schauli and Dolf Loewenstein, London, England. November 3, 1903. Filed July 14, 1903.

743,405. Sparking Coil for Gas Engines.—Elliott J. Stoddard, Detroit, Mich. November 3, 1903. Filed February 24, 1902.

743,097. Kerosene Engine.—George A. Phail, of Flushing, N. Y.

743,514.—Magnetic Clutch.—Camille Jenatry, Fils, Brussels, Belgium. November 10, 1903. Filed June 27, 1903.

743,598. Electric Battery.—Edmund Tweedy, New York, N. Y. November 10, 1903. Filed December 31, 1902.

743,915. Valve Gear for Explosive Engines.—Walter J. McVicker, Rogers, Neb. November 10, 1903. Filed September 22, 1902.

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...EVERY WEDNESDAY...

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Improvement in Exports.

Recent monthly reports of exports of automobiles and parts show so satisfactory a gain that, notwithstanding a lull in this branch of trade during the past summer, the total value of automobile exports for the first nine months of the current year exceeded the figure for the corresponding period last year by over 40 per cent. The very considerable growth in export business in recent months is apparent in the figures for September. During that month the exports exceeded those of the same month the year before by 132 per cent.

As was noticed in these columns some four or five months ago, the first rapid rise in the export of American automobiles was followed by a lull and even a decline. While there really never was any marked decrease in the value of exports, at any rate they had ceased to increase, and it seemed to us opportune to sound a warning note. The first demand for American cars in Europe was chiefly for low priced vehicles. The cars exported were of a low grade and naturally failed to give complete satisfaction in many instances. When the shortcomings of these cars became widely known abroad the demand for them shrunk, and this led to the falling off in the value of exports above noted.

Meanwhile, however, there has been a complete reorganization of the representation for American cars abroad, and many of the manufacturers of high grade cars in this country have joined the ranks of exporters. The average American car offered to the European purchaser at present is a great improvement over the car offered two years ago, and the European public evidently regards the American car with increased confidence, as witnessed unequivocally by these export figures.

The greatest foreign market for American automobiles at present is in England.

The English people fancy the simple lines of the average American car, and appreciate its greater freedom from noise and vibration, as compared with the average French voiturette. France, of course, will be our greatest competitor in the markets of the world, and the French automobile industry is now making strenuous efforts to extend its foreign markets. Not only will it be fully represented at the St. Louis Exposition next year, but it has just been decided to participate officially in the Vienna Alcohol Industries Exhibition next year, which promises to become chiefly an automobile exhibition. In extending its foreign markets the French industry is greatly aided by its trade organizations, and it is to be hoped that the N. A. A. M. will be of equal service to the American industry in this respect.

Danger of Unlocked Cars.

Reports are continually coming into this office of damage caused by street urchins accidentally or mischievously starting cars which had been left standing at the curb. Such accidents cannot well occur abroad, for there it is an offense to leave a car unattended in the street. In this free country, naturally, no such restrictions are made, and every driver owes it to himself to make provision that no accident of any kind can occur during his absence. The value of being able to lock a car to prevent unauthorized starting during the driver's absence is fully appreciated by inventors, and numerous patents have been taken out on such locking devices. At one time no less than twenty applicants for patents were in interference with each other in the Patent Office in connection with inventions for automatically locking a car when the driver leaves his seat, either voluntarily or by accident.

Nearly every car, whether gasoline, steam or electric, is provided with some locking means to protect it from mis-

chievous persons. Unfortunately, owners seem to make little use of these locking means, or there could not be so many accidents of this kind. In most places the drivers are required by law to lock their cars when leaving them, and can be held responsible for damages resulting from neglect to comply with this requirement. The owner's own interests therefore demand that the power mechanism of the car should be locked whenever the car is left standing on city streets, and it is also very desirable from the standpoint of the automobile industry, as reports in the daily press of automobiles crashing through plate glass windows, etc., are not encouraging to the prospective automobile buyer.

The Automobile on the Stage.

Since the automobile has become so popular among society people during the past few years, it is only natural that use should be made of it on the stage in the so called society drama, in order to lend a final touch of modernness to the play. The electric vehicle is used exclusively for this purpose, we believe, being certainly the one best adapted, owing to its ease of control and its freedom from noxious gases. The lightest type of runabout, and even heavy cabs are employed on occasions, but the latter, owing to their excessive weight, are usually deprived of their batteries and are "dead" when on the stage, being pushed on by hand before the curtain rises and remaining immobile until the curtain falls again.

Of late the automobile, or, more strictly, the imitation automobile, has also made its appearance on the vaudeville stage, both in England and in this country. The most comic feature of automobile life according to the English view is apparently an encounter with a "minion of the law," for it is the subject with which most English automobile stage skits deal. American vaudevillians exploit such features as the automobile face—grossly exaggerated chauffeurs' face masks—the crank act and breakdowns, accompanied by fireworks. Continued and fruitless work at the crank, interrupted by periods of rest during which the unlucky chauffeur wipes the sweat from his brow, seems to appeal particularly to the risibles of the public, and this may explain to automobilists why they are so soon surrounded by an interested crowd when they

are doing the crank act on the street without success.

Trials of Electric Cars.

In our last issue a reader suggested that trials be organized for electric cars, to determine their speed and mileage capacity. We incline to the opinion that such trials would be of little practical value. It has been shown in numerous private tests that it is possible to build electric cars to cover a very long distance on one charge—we believe the record is 192 miles—and also to run at very high speed, but it is also well known, in technical circles at least, that such phenomenal mileage capacity or speed can only be secured at the expense of durability. If the manufacturers of electric cars did not care about sacrificing durability, they could improve the mileage and speed of their vehicles in every case. But this would not be improvement.

It will now be seen, we believe, why a short trial of electric cars would be of no practical value. Durability would not enter as a factor, and the tendency would therefore be to increase the mileage and speed at the expense of durability, hence the results of such a trial would be illusory.

Trials of electric cars have repeatedly been proposed abroad, but no such trials have ever been held. The A. C. G. B. and L., about a year ago, upon the complaint of some members that it neglected electric vehicles, proceeded to organize electric trials, but no entries were received and the event was dropped. A short while ago a French publication announced that it would organize a trial for electric cars, but the date fixed has passed and the trials have not materialized.

As the efficiency of an electric automobile depends to such an extent upon its battery, the most practical plan of encouraging improvement in the electric vehicle line, and at the same time of furnishing useful information to prospective purchasers, would be to organize competitive storage battery trials, the tests to be continued until the batteries are practically worn out.

The Horse and the Automobile.

According to the daily press, the annual New York Horse Show, which was held at Madison Square Garden last week, was a greater success than any of its prede-

cessors, so it would seem that the advent of the automobile has not in the least lessened the popularity of the horse in society circles. But as there are at least two sides to every question, the success of the horse show is capable of different explanations. Some, of course, hold that the horse is not the chief attraction at the horse show, and that its success does not justify any conclusion as to the popularity of the horse. On the other hand, it would not be difficult to understand society's interest in reviewing horses at a show now that they make so little use of them in their pleasure drives. One thing certain and characteristic is that a large proportion of the visitors drove to the show in their automobiles.

We also notice that Col. Henry Watterson, from the good old horse raising (and racing) State of Kentucky, has just put in a good word for the automobile. At least the tone of his utterances is very friendly. Colonel Watterson holds that there is neither fairness nor sense in singling out the automobile for special legislation. "Make speed regulations if necessary," he says, "but let them apply to animal drawn as well as motor propelled vehicles." Colonel Watterson's evident desire of doing a good turn to the automobile movement is fully appreciated, and should meet with general approval, the more so as his recommendations are absolutely harmless from the standpoint of the horse interests. For, since the speed limits for automobiles in the more liberal States vary from 20 to 25 miles per hour, it would require an exceptionally good horse (even Kentucky bred) to exceed the limit for many minutes at a time. However, Colonel Watterson has given proof of his good intentions, and that is certainly worthy of recognition.

Responsibility of Motor Liveries Established.

Kelham Langdale, of London, recently hired an auto for a journey to Chalfont, St. Giles. At Canonbury the car refused to go any further for less than half an hour's coaxing, it consented only to proceed even then with one cylinder, and opposite the gates of Hanwell Asylum it stopped dead. From that point on it had to be pushed and hauled, so that there was nothing to do but abandon it. Mr. Langdale and his friends were six hours late at Chalfont, and as they missed a business appointment he brought an action for damages against the automobile company. He was awarded 5 guineas.

Concerning New Threads for Automobile Work.

By HARRY E. DEY.

It is generally conceded among mechanics that the United States standard thread is too coarse for first class work, especially for automobiles, where a coarse thread screw will not remain tight owing to the constant vibration; besides, the parts are greatly weakened by the deep cut, necessitating larger diameters, which in turn adds to weight, cost, etc.

The writer has taken this subject up with the idea of arriving at a standard satisfactory to the manufacturers, and as most of the manufacturers buy their bolts and nuts ready made, I see no reason why the bolt and nut manufacturers should not be willing to make them as a stock article if the automobile people will agree to a standard. The writer, however, favors each shop making its own bolts and nuts, as they may then be made to suit each individual case. Bolts subjected to shearing stresses do not require the same thickness of head and nut as bolts under tension, and even in the latter case a nut of half the standard thickness will stand a strain equal to the strength of the bolt, besides having a much neater appearance. Nuts which are frequently removed should be thicker, and threads in aluminum and cast iron should be coarser.

I have entered into correspondence with a majority of the leading manufacturers, and from the tone of their replies believe the time is ripe for agreeing upon a standard, many of them commending the object of my inquiry. It will be noted in the fol-

lowing extracts that 20 pitch thread appears to be the favorite special thread regardless of diameter.

The Autocar Company formerly used the United States standard thread, but about a year ago adopted 20 pitch for a standard, regardless of diameter above $\frac{1}{4}$ inch. They have not changed over completely yet, but are using the 20 pitch to a large extent.

The Cleveland Automobile Company use the United States standard thread.

The Commercial Motor Company, formerly the Pan-American Motor Company, use the United States standard, with the exception of places where it is necessary to use a fine thread.

Byron V. Covert & Co.: "Have adopted the bicycle standards of threads, especially for small bolts and screws. For 5-16 inch and $\frac{3}{8}$ inch bolts we use a 24 thread; for $\frac{1}{2}$ inch bolts 20 thread when used in steel, and 12 thread if used in aluminum or cast iron. All the other bolts used, for attaching springs to angle iron frame, etc., are standard machine bolts."

Duryea Power Company: "We are using what we have called bicycle sizes, i. e., the finest thread for the various diameters regularly turned out by standard tap and die makers. We would have adopted finer threads in many cases if taps and dies for same could be found with reasonable ease throughout the country. The sizes we use are 3-16-22, $\frac{1}{2}$ -24, 5-16-20, $\frac{3}{8}$ -18, 7-16-20 (bicycle axle size), and practically all special sizes larger than these are 20 thread. Our axle nuts are $\frac{3}{8}$ -12. With this one exception we use no coarser thread than 16 per inch, which we find very satisfactory for cast iron."

"There is much to be said in favor of finer threads than have been used in the past. A coarse thread is a relic of crude iron, particularly cast iron and soft brass construction; a fine thread should be used in steels, for it does not cut away the stock so much, does not unscrew easily, and insures a better fit being made; for a fine thread, if not properly fitted, will give trouble sooner than a coarse one. While the commonly accepted standard sizes may have been right when adopted, they are certainly not right now."

Electric Vehicle Company: "We use United States standard threads on nearly all bolts, screws, studs and brake rods, except in special cases. On steering connections and parts where adjustment is required we use fine threads, as well as in a few places where thickness of metal will not warrant standard depth of thread."

Elmore Manufacturing Company use United States standard threads, except for special nuts and bolts used for adjustment. They advise using $\frac{1}{2}$ inch pipe thread for spark plugs.

Ford Motor Company: "Wherever possible we are using United States standard screw threads. We have a few specials, but we expect to adopt the above mentioned thread entirely."

H. H. Franklin Manufacturing Company: "Wherever possible we use the standard United States bolts and nuts, but in specially important places we use a finer thread, as on valve stems, axle ends, etc. It would be a boon to automobile manufacturers, as well as many others, if we could buy standard bolts and nuts of a considerably greater number of threads to the

TABLE I

Number of Threads to the Inch		DIAMETERS.			AREAS.			Increase of Area		Area at Bottom of 20 Thread	Per cent. Increase in Area with 20 Thread Over Present U. S. Standard.
		Of Bolt.	At Bottom of Thread.		Of Bolt	At Bottom of Thread.		Square Inches.	Per cent		
Present	Proposed.	Inches.	Present Inches.	Proposed. Inches.	Square Inches	Present. Square In.	Proposed Square In.	Square Inches.	Per cent		
20	24	$\frac{1}{8}$	.185	.1958	.04908	.027	.03	.003	11.11		
18	24	$\frac{9}{16}$	.240	.2553	.07669	.045	.0525	.0075	16.66		
16	22	$\frac{5}{8}$	.294	.3160	.1104	.068	.0785	.0105	15.44		
14	22	$\frac{3}{4}$	.344	.3785	.1503	.093	.1125	.0195	20.96		
13	20	$\frac{7}{8}$	.400	.435	.1963	.126	.1488	.0228	18.09		
12	20	$1\frac{1}{8}$	.454	.4975	.2455	.162	.1943	.0323	20.		
11	18	$\frac{9}{8}$	.507	.5525	.3067	.202	.240	.038	18.81	.246	21.78
10	18	$\frac{7}{8}$	.620	.6775	.4417	.302	.361	.059	19.53	.373	23.51
9	16	$\frac{3}{4}$	.731	.794	.6013	.420	.495	.075	18.	.515	22.62
8	16	1	.837	.919	.7854	.550	.663	.113	20.54	.685	24.54
7	14	$1\frac{1}{8}$	.940	1.0315	.9940	.695	.837	.142	20.41	.880	26.52
6	14	$1\frac{1}{4}$	1.160	1.2815	1.227	.895	1.051	.156	17.43	1.102	24.24
7	14	$1\frac{1}{2}$	1.284	1.4065	1.707	1.297	1.555	.258	19.89	1.617	25.44
5 1/2	12	$1\frac{3}{8}$	1.389	1.5165	2.073	1.518	1.808	.290	19.1	1.909	25.76
5	12	$1\frac{1}{2}$	1.499	1.6415	2.405	1.743	2.115	.372	21.34	2.226	27.71
5	12	$1\frac{3}{4}$	1.615	1.7665	2.761	2.05	2.45	.400	19.51	2.572	25.46
4 1/2	12	2	1.712	1.8915	3.141	2.305	2.81	.505	21.9	2.939	27.50
4 1/2	10	$2\frac{1}{4}$	1.962	2.12	3.976	3.025	3.53	.50	16.69	3.746	23.82
4	10	$2\frac{1}{2}$	2.175	2.37	4.908	3.720	4.41	.69	18.54	4.654	25.65
4	10	$2\frac{3}{4}$	2.425	2.62	5.939	4.62	5.36	.76	16.45	5.650	23.46
3 1/2	10	3	2.628	2.87	7.068	5.43	6.47	1.04	16.15	6.750	24.50
3 1/2	10	$3\frac{1}{4}$	2.978	3.12	8.298	6.52	7.65	1.13	17.33	7.975	22.31
3 1/4	8	$3\frac{1}{2}$	3.100	3.337	9.621	7.55	8.75	1.20	15.89	9.3	22.3
3	8	$3\frac{3}{4}$	3.377	3.587	11.044	8.65	10.10	1.45	16.76	10.676	23.42
3	8	4	3.566	3.837	12.566	10.00	11.58	1.58	15.8	12.12	21.20

inch than at present. For instance, we consider a $\frac{3}{8}$ inch bolt with 24 thread about the proper thing. Other bolts should be threaded in proportion."

Haynes-Apperson Company are using, as far as possible, standard thread screws for all of their machines.

The Locomobile Company use 32 pitch for 3-16 inch screws, 20 pitch for $\frac{1}{4}$ inch to $\frac{3}{8}$ inch inclusive; 16 pitch for $\frac{1}{2}$ inch to $\frac{3}{4}$ inch, and under 3-16 inch standard machine screws are used.

The "Mobile" Company enclose the following list: 6-32, 8-32, 10-32, 12-14, 14-20, 18-20, 9-32-30, $\frac{1}{4}$ -24, 9-32-30, 5-16-18, 5-16-20, $\frac{3}{8}$ -16, 7-16-14, $\frac{1}{2}$ -13, $\frac{1}{2}$ -12, 9-16-12, $\frac{5}{8}$ -11, $\frac{3}{4}$ -10, 11-16-24, $\frac{7}{8}$ -9, 1-10, 9-16-24, $\frac{3}{4}$ -20, $\frac{1}{2}$ -20, 7-16-20, $\frac{3}{4}$ -20, $\frac{3}{8}$ -24, 9-16-18, 11-16-24, 5-16-30, $\frac{3}{4}$ -20, 15-16-24, $\frac{1}{4}$ -14, $\frac{3}{8}$ -20, $\frac{1}{2}$ -24, $\frac{1}{2}$ -16, $\frac{1}{4}$ -16, $\frac{3}{8}$ -14, $\frac{1}{2}$ -12, $\frac{1}{4}$ -12, $\frac{1}{2}$ -18, 1-32, $\frac{1}{4}$ -24, $\frac{1}{2}$ -14, $\frac{3}{8}$ -18, $\frac{1}{2}$ -12, 1-24, 1-16, 15-16-14, 15-32-18, $\frac{3}{4}$ -18, $\frac{3}{4}$ -16, $\frac{3}{4}$ -16.

National Motor Vehicle Company: "Are using standard thread entirely on all our screws and bolts, except in a few instances, such as axle ends, where we are using 20 pitch thread."

The Olds Motor Works report that they are using the United States standard threads on almost all of their work.

The Packard Motor Car Company state that they have already adopted fine thread standards for all of their car construction, as they do not believe that the United States standard threads are at all suitable for the work. "The threads we have adopted are practically the same as are now used in a number of the foreign cars and from which the very best results have been secured."

Pierless Motor Car Company: "We use standard threads in our work wherever it is possible; where not, we have to cut special threads. Almost without exception we buy our bolts and nuts, and they have the standard threads."

George N. Pierce Company: "We, of course, try to use the standard United States threads on bolts, screws, etc., wherever possible, but there are many cases where we have to depart from this standard, as the threads are altogether too coarse, making the bolt or stud very weak, and they have a greater tendency to shake loose. We have scarcely adopted any standard as yet, though we use the following very largely:

Diameter of Bolt.	U.S. Standard.	Used in Preference.
$\frac{1}{4}$	20	24
5-16	18	24
$\frac{3}{8}$	16	20
7-16	14	20
$\frac{1}{2}$	13	16
9-16	12	16
$\frac{3}{4}$	11	16
$\frac{3}{4}$	10	16

"Some time ago Mr. Porter read a paper before the American Society of Mechanical Engineers in which he proposed new pro-

portions for screw threads. He went fully into the matter, and the table he gives seems to us to meet the requirements of automobile manufacturers much better than the United States standard, though there might be some places, such as tapped holes in aluminum and cast iron, where it would be preferable to use a coarse thread, as the thread in these metals is often torn somewhat in tapping, and in the case of a fine thread would soon strip, so that judgment must be used in adopting any particular standard to suit the material and situation in which it is to be used."

Searchmont Automobile Company: "We are using United States standard threads on our cars, except in a few places where it is necessary to use a finer lead. In such cases we use on small studs and fittings 24 threads per inch. On larger and heavier work we use 18 threads. You will note from this that we have only two special sizes outside of the regular United States standard, which we endeavor to use wherever possible."

St. Louis Motor Company use the United States standard entirely.

The J. Stevens Arms and Tool Company state that they endeavor to use the United States standard thread on all bolts where possible. When a special is required, 20 threads are used."

Studebaker Brothers Manufacturing Co. state that they have used standard threads almost exclusively. In a few places they have found it necessary to use finer threads, which vary from 16 to 24.

The E. R. Thomas Motor Company express themselves as being in favor of a universal standard being adopted, and think it would be a mutual benefit to all.

The Pope Motor Car Company: "On our general work we endeavor to use standard threads, for our own and purchasers' convenience, but on some parts of the cars where standard threads are prohibitory we generally use 20 pitch."

The United States Long Distance Company use United States standard threads wherever possible.

The Waltham Manufacturing Company write: "We almost universally use sharp V threads in our designs and adhere to the United States standard pitch wherever practical. However, conditions in automobile work are so exacting that sometimes we are obliged to depart widely from this standard and to design special threads, because of lack of space in which to place sufficient material for standard parts."

White Sewing Machine Company state that they favor the United States standard thread, as they believe it is the most practical one to use.

Winton Motor Carriage Company state that in a general way they intend to use United States standard threads on everything.

Woods Motor Vehicle Company: "We buy as many of our bolts and nuts as we can with standard threads. Threads for adjusting ball bearings we cut 20 to the

inch, irrespective of diameter. There are some special bolts on our equipment, but we cut the thread standard."

As mentioned in the letter of the George N. Pierce Company, a paper on a new standard for screw threads was read last December before the American Society of Mechanical Engineers by Charles T. Porter. In addition to changing the pitch he also advised filleting the corners at the base for additional strength. His proposed changes are shown in the first three columns of Table 1. The writer cannot see any good reason for a variable pitch ratio for automobile work, except for different metals. A close fitting 20 thread has fully as much strength as any of the coarser threads, and the bolt by far greater tensile strength, as is shown in the last two columns of the above mentioned table, which were added by the writer. The gain in strength of the bolt approximates an average of 25 per cent. over the United States standard. In automobiles, where every ounce counts, this ought to be well worth considering. The use of a large bolt often means a proportionate weakening of the part through which it passes. At other times it means heavy bosses, or other additional weight. It is these little things that appear to be so sadly neglected in automobile work, and while they are small in themselves, they accumulate a big percentage of compound interest. The use of a single pitch would greatly simplify matters, both in the drafting room and the shop.

In the writer's judgment the standard pitch for diameters above $\frac{1}{4}$ inch should range between 16 and 20 threads, or preferably be 20, except for aluminum and possibly also cast iron, and even in these latter cases, by using studs which screw up tight to the end of a thread and are never removed, the nut serving for that purpose, 20 pitch ought to be satisfactory.

Potassium Carbonate-Glycerine Non-Freezing Solution.

Since the question of anti-freeze solutions is on the tapis, we would call attention to a solution suggested by E. Mallinckrodt, Jr., in our issue of March 4 last, which solution is claimed to attack iron very much less than calcium chloride solution. The solution is composed of seventy-five parts by weight of ordinary carbonate of potassium (salts of tartar) in a hundred parts by weight of water, to which fifty parts by weight of glycerine has been added. Actual experiment has shown this mixture to remain perfectly liquid at a temperature of 22° below zero Fahr. If it is not necessary to provide for such a low temperature, less glycerine can be used. The carbonate of potash used by Mr. Mallinckrodt was not the dry article, but contained about 5 per cent. of water; it should cost 10 to 25 cents per pound. Glycerine may be bought for from 15 cents to 25 cents per pound.

The Planetary Transmission Gear.

As the maximum turning effort of a gasoline motor is quite limited, and the motor will stop when it is overloaded, and also because a gasoline motor cannot be run backward, it is necessary to provide gasoline cars with a variable gear permitting the gear reduction from the motor to the driving wheels to be varied and the direction of transmission to be changed. It will, of course, be readily understood how an increase in the gear reduction ratio will increase the hill climbing power of a car. For instance, a light car is usually so geared that under normal conditions the road wheels make one revolution to about three of the engine, the sprocket wheel on the rear axle having three times as many teeth as the sprocket pinion on the engine shaft. If now the gear reduction be changed so that the driving wheels make one revolution for, say, twelve of the engine shaft, it will be perceived that for the same engine speed the car will run four times slower, but the engine will pull four times as much, neglecting the additional friction loss in the gearing. While touring cars frequently have an intermediate gear, between the high and low, runabouts have as a rule only two forward gears besides the reverse gear. In probably over 90 per cent. of the gasoline runabouts made the change of gear reduction and the reversal of transmission for backing are effected by what is variously known as the planetary gear, sun and planet gear or epicyclic gear. The object of the present article is to fully explain the mode of operation of this gear in elementary terms.

The drawings herewith, Figs. 1 to 4 inclusive, illustrate a typical form of sun and planet transmission gear. Fig. 1 is a

side elevation of the gear with the upper half shown in section. Fig. 2 is an end elevation of the gear; Fig. 3 is a section through the slow speed gears, and Fig. 4 a section through the reversing gears.

The entire gear is mounted on an extension of the engine shaft, and at the left, in Fig. 1, is seen a portion of the engine flywheel keyed to the shaft. The operation of the gear is such that for the high speed the sprocket pinion is clutched to the shaft by means of a friction clutch, consequently the sprocket pinion turns at the same speed as the engine shaft and the power is transmitted directly by chain from the engine shaft to the rear axle; while for slow speed forward and backward motion the power is transmitted from the engine shaft to the sprocket pinion through a system of spur gears, causing the sprocket pinion to rotate slower than the engine shaft—in the same direction as the shaft for slow forward motion and in the opposite direction for backward motion.

PARTS OF THE GEAR.

Fixed upon the engine shaft are two spur pinions, H and D. Loosely mounted upon the shaft are the following parts, which are all rigidly secured together by means of pins P: The internally toothed gear wheel A, the sprocket pinion, the brake drum and the disk B. The disk B has secured in it four laterally projecting studs C upon which revolve the planetary pinions for the slow speed forward motion. All of these pinions are in mesh with the slow speed driving pinion D, which is securely pinned to the engine shaft, and also with the internally toothed gear wheel K for the low speed. Over the hub of the pinion D is secured a sleeve or collar E, with four pairs of

radial brackets to which are pivoted the friction clutch dogs. To the inner end of the collar are secured by screws four flat steel springs F, to the outer ends of which are fastened metal blocks L adapted to bear against the lateral surface of the low speed gear drum K. Adapted to slide freely on a feather key in the engine shaft is a clutch operating collar of conical form which co-operates with the clutch dogs, and when forced inward by means of a forked clutch lever M forces the radially extending arms of the clutch dogs against the clutch springs F and presses the clutch blocks L in firm contact with the low speed gear drum K, thereby preventing the gear from rotating with relation to the collar E, and consequently with relation to the low speed pinion D. Referring now to Fig. 3, it will be seen that if the internal gear K and the pinion D are clutched together as just described, there can be no motion of the planetary pinions on their studs C. The whole gear is then locked together and carries along the disk D and the sprocket pinned to it (Fig. 1). Hence the sprocket pinion is secured to the engine shaft and rotates with it at the same speed, thus giving the high gear or direct drive. The high speed is thus obtained by forcing the clutch collar between the clutch dogs by means of the forked clutch lever M. It will be seen that when the car is being operated on the high gear none of the gears and pinions of the change gear are in operation, all these gears rotating idly with the shaft. When the car is operated on the low gear, only the gears and pinions enclosed in the drum K are in operation, and when the car is being run backward only the gears and pinions enclosed in the drum A are in operation. The friction clutch is "in" only when the high gear is in operation,

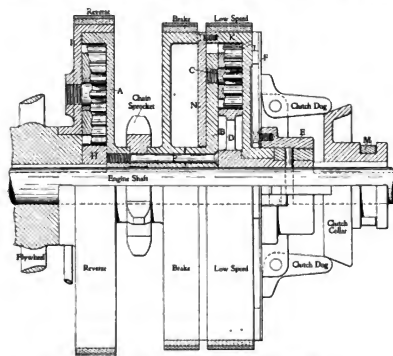


FIG. 1.—ELEVATION OF GEAR, UPPER HALF IN SECTION.

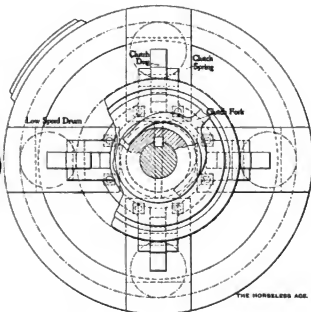


FIG. 2.—END VIEW OF GEAR.

THE HORSELESS AGE.

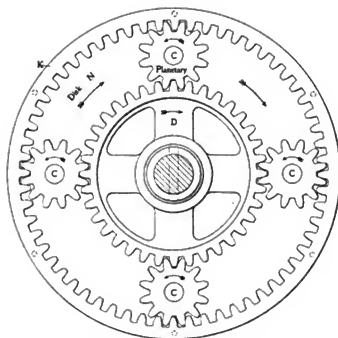


FIG. 3.—LOW SPEED GEAR.

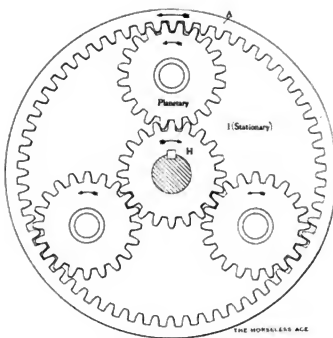


FIG. 4.—REVERSING GEAR.

and "out" for both the low forward and reverse speeds.

THE SLOW FORWARD GEAR.

The slow forward speed is obtained in the following manner (Fig. 3): The friction clutch is now out of engagement, and the sprocket pinion and parts pinned to it are free to revolve upon the engine shaft. The internally toothed gear wheel K, forming the low speed drum, is surrounded by a friction band, which can be firmly applied to it by means of a mechanism to be described further on. When this friction band is applied to the drum the latter, of course, remains stationary. The slow speed pinion D, being pinned to the engine shaft, turns with the latter in a right-handed or clockwise direction. The

four planetary pinions meshing with both the rotating central pinion D and the stationary internally toothed gear wheel K are thereby caused to turn left-handedly around their studs C, and this rotary motion causes them to roll on the internally toothed gear wheel K in a right-handed direction, carrying the disk B into which the studs C are secured with them. As shown in Fig. 1, the disk B is secured to the sprocket pinion, and the latter therefore rotates at the same speed as the planetary pinions roll around the internally toothed gear K.

In the gear illustrated the internal gear wheel K has 60 teeth; the slow speed pinion D 36 teeth, and each of the planetary pinions 12 teeth. With this propor-

tion in the number of teeth of the different gears the disk B supporting the studs on which the planetary pinions revolve will make one complete revolution for every two and two-thirds revolutions of the engine shaft.

the engine shaft, and a friction band. The arrangement is in a sense the reverse of that for the slow forward speed, inasmuch as the disk to which the pinion studs are secured (instead of the internal gear wheel) is held from rotating by the friction band, and the internal gear wheel (instead of the disk) is secured to the sprocket pinion. The disk I is free to rotate on the hub of the engine flywheel, but can be held stationary by means of the friction band. The reverse pinion H rotates, of course, with the engine shaft in a right-handed direction, and causes the planetary pinions to revolve on their studs in a left-handed direction. The friction band being applied to the drum I, the studs are stationary, and the rotation of the planetary pinions causes the internally toothed gear wheel A to rotate left-handedly around its centre line. As the internal gear wheel A is secured to the sprocket pinion, the latter now rotates in a left-handed direction, or opposite to the direction of the engine shaft, thus causing the car to run backward.

In the gear shown the reverse driving pinion H and the planetary pinions have each 20 teeth, and the internal gear has 60 teeth. With this proportion in the number of teeth of the gears the internal gear A makes one revolution for every three revolutions of the engine shaft. Hence the backward motion is still slower than the slow forward motion, which is rendered desirable by considerations of safety.

To the sprocket pinion is also secured a brake drum, of the same diameter as the two gear drums. A friction band can also be applied to this drum, for purposes of retarding and stopping the motion of the

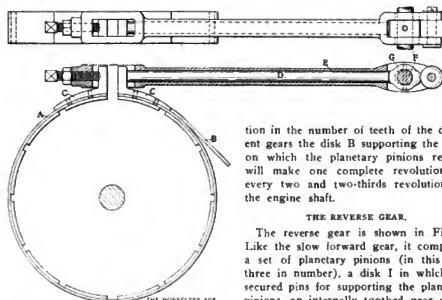


FIG. 5.—OPERATING MECHANISM.

THE REVERSE GEAR.

The reverse gear is shown in Fig. 4. Like the slow forward gear, it comprises a set of planetary pinions (in this case three in number), a disk I in which are secured pins for supporting the planetary pinions, an internally toothed gear wheel A, a central driving pinion H geared to

vehicle. Secured to a slow speed drum K by screws is a plate or disk N, which serves no particular purpose in the operation of the gear, but encloses the low speed pinions, protecting them from dust and rendering thorough lubrication possible.

THE OPERATING MECHANISM.

A planetary gear may be operated either by a single hand lever or by a hand lever and either one or two foot levers. A method by which all the gears may be operated by a single lever is illustrated in Fig. 5. The lever is secured to the end of a shaft F extending transversely through the body of the vehicle and carrying a lever arm and several double cams. A represents one of the friction bands for holding parts of the gear from rotating. This band is supported by a strap B fastened to the frame of the car, and its two free ends are provided with two lugs C. Between these lugs C and the cams G on the shaft F extend tubes D with internal rods E. The tube D is provided with rectangular yokes at both ends, the yoke at one end spanning the shaft F and the yoke at the other end the two lugs C. A set screw in the last named yoke bears against one of the lugs C and the end of the rod E against the other lug C. It will be immediately apparent from the drawing that when the raised portions of the cam engage with the end of the rod E and with the yoke on the tube D, respectively, the tube and the rod are moved in opposite directions and the two lugs C are forced together, thereby applying the friction band to the drum.

Winter Use of Automobiles.

By A. L. CLOUGH.

The commencement of settled cold weather is the signal for "turning out to grass" a very large proportion of all self-propelled vehicles. Wheels are jacked up, tires deflated, tanks drawn off and a canvas cover drawn over the retired vehicle, not to be removed until the machine is ready for the spring overhauling.

A few doctors, an occasional enthusiastic layman and a stray delivery wagon seem to form the noble army of winter users. These people deserve credit, especially the doctors—for they are helping to create a public belief in the all the year round usefulness of the automobile. Physicians as a class can tell more in regard to cold weather troubles than any others. They drive their machines when they must, not when they choose, and if all their experiences were made known it would be the next best thing to a cold weather reliability run. There can be little doubt that the majority of machines are put out of commission during the winter from choice and not from necessity. The fact is that at present practically all automobiles are pleasure vehicles and there is no pleasure in automobile driving during the winter. If housed in heated

stables one may say with confidence that almost all automobiles, particularly the gasoline machines, are capable of giving good service all winter in our cities. If one has no stable for his machine there will be much trouble experienced in connection with its use during the cold weather. His cylinder oil will assume the consistency of lard, everything will work stiffly, the carburetor will not work, and one will almost begin to doubt the explosiveness of gasoline mixtures. A gasoline automobile in an unheated stable has the redeeming feature of furnishing a splendid winter gymnasium where one may perform exercises with the crank, commencing with the relief cocks open and gradually working up to practice with full compression.

TECHNICAL DIFFICULTIES.

One may say that the technical difficulties of operating a motor vehicle during cold weather are four in number:

1. Difficulty of securing correct gasoline mixtures at low temperature.
2. Irregularities of lubrication due to increased viscosity of oils at low temperature.
3. Danger of freezing of pipes, jackets, tanks, etc.
4. The alleged increased tire troubles due to changes in resilient qualities of rubber when cold, and other causes.

CARBURATION.

The capacity of air for gasoline vapor at low temperature is quite small. The lower the temperature of the air the less gasoline it will hold, and a point is finally reached when it will absorb so little of the explosive as to render the mixture imperfectly combustible. When it is attempted to operate a gasoline engine at such a temperature it is found impossible to secure proper explosions. However, at almost all temperatures commonly met with in this climate, gasoline is sufficiently volatile to give practical results, especially if the air be heated artificially before entering the carburetor. Gasoline automobiles for winter use should have some provision for heating the air used in forming the explosive mixture. This is accomplished ordinarily by making use of the heat of the exhaust from the muffler. The air intake pipe may be jacketed by a portion of the hot gases escaping from the muffler or the vaporizing chamber may be jacketed in the same way. A carburetor so provided will furnish a proper mixture to its engine after it is fairly in operation, but it is sometimes a puzzle to secure the first explosion of a motor which is cold and taking air at a low temperature. It is obvious that the heat necessary to vaporize the gasoline for the first explosion must all come from the metal of the carburetor or from the surrounding air, and when both are in a cooled condition there is little tendency for a proper evaporation of the liquid which is chilled by contact with the cooled metal. After the carburetor does give a good mixture it may

under some conditions of low temperature be condensed in the cold cylinder, and if the air happens to be warmer than the engine, moisture may be condensed upon the spark plugs and even affect the sparking. An engine which cannot be started on account of the cold can sometimes be made to operate by filling the water jacket with hot water and by pouring hot water over the carburetor, air inlet pipe and the mixture pipe or by laying cloths wrung out in hot water upon these parts. Such treatment is generally successful. After the carriage has been in operation for some time it may be left standing out of doors for a considerable period with the engine shut down and still no difficulty will be found at starting it up. If the water and the metal have been quite thoroughly heated up, they part with their heat quite slowly. Some people make it a point to use the very light grades of gasoline in the winter, as the high test liquids evaporate freely at a considerably lower temperature. One can say, in general, that there is no difficulty in keeping a gasoline engine which is suitably supplied with warmed air in continuous operation at any winter temperature, after it is once started, and that there is no difficulty in starting an engine, no matter how cold it may be, if the procedure recommended be followed. In starting from a warm stable there is obviously no difficulty, and there should be no difficulty found in starting after a stop of any reasonable duration in the open air.

LUBRICATION.

There need be no very serious trouble in the lubrication of an automobile kept in a heated stable, because the machine starts out with its lubrication normal, and under all ordinary conditions the heat developed by the engine prevents the chilling and stiffening of the lubricants. With the mechanical lubricators now so much used the thickening of the oil due to cold is of comparatively little moment, for about the same amount of lubricant is fed in a given time whether it is thick or thin. With the sight feed cups, however, the amount of oil flowing depends entirely upon its thickness. The automobilist who has no heated stable will have a sorry time with his cylinder lubrication. The oil in the various bearings will be so thick that the engine will turn over with difficulty, the oil in the engine base will be about like good vaseline, and the cylinder oil cups if adjusted to feed properly in their cold condition will flood the cylinder when the engine becomes warmed up. It has been recommended that a quantity of kerosene be mixed with the cylinder oil in the winter sufficient to give it the requisite fluidity, and although the writer has not tried this, there would seem to be no reason why it should not prove effective. Cylinder oil is certainly soluble in kerosene. On the whole, it may be said that an automobile equipped with a system of forced lubrication, if kept in a

heated stable (which is the sine qua non of the winter use of automobiles) and oils of the proper character are made use of, there should be no serious troubles with lubrication.

ANTI-FREEZE SOLUTION.

The season has nearly arrived when the users of gasoline machines are preparing to substitute for the cooling water in their tanks some anti-freeze solution, but there will probably be some unfortunate and belated individuals who will neglect this until on some sharp night their radiators freeze and crack, or—what is infinitely worse—the water in the engine jacket freezes and splits the cylinder casting, necessitating an expensive renewal of the injured part. Fortunately we have means to make Jack Frost a harmless foe as far as the cooling systems of gasoline automobiles are concerned. Anti-freeze solutions are cheap and absolutely effective. It was the writer's good fortune to be the first to suggest the use of calcium chloride solution for this purpose, and as far as can be learned this solution is proving to be all that was claimed for it when properly made up. Calcium chloride is a cheap chemical product, but it is quite variable in respect to the amount of water of crystallization which it contains and also somewhat variable as to its neutrality, and it is thus a little hard to tell what one is getting when calcium chloride is called for at the chemist's. It is plain from accounts which have been published that some so called chemists are unscrupulous or ignorant enough to deceive their customers into taking chloride of lime instead of chloride of calcium—two compounds which are hardly more alike than chalk and cheese. Calcium chloride is generally

marketed in the form of the fused salt and is of a dirty white color, with a fracture somewhat resembling marble. It is generally very moist and covered with its own saturated solution. For automobile purposes it should be slightly alkaline. A correspondent in these columns recently made the statement that his sample of calcium chloride would turn red litmus paper blue, and blue litmus paper red. This is most remarkable, and it would seem that there must have been some mistake. If the calcium chloride be slightly alkaline, as it should be, there will be no danger of the corrosion of the metals with which it comes in contact. Just how much of the salt should be used per gallon of the cooling water depends upon the amount of water of crystallization that the particular grade of chloride contains. The probable amount required will be from three to five pounds per gallon, but one may have to do some experimenting on his own account unless the quality of the salt which he has is exactly known. While there may be no fear of corrosion when the salt is properly used, it is possible that some trouble may be experienced in the lubrication of the circulating pump when calcium chloride is used. If the lubricant employed be animal oil or grease and the cooling solution can come in contact with it, the result will be a formation of a lime soap which will destroy the lubrication. If graphite or other purely mineral substance be used for the lubricant, there should be no trouble from this source. It would be for the benefit of all concerned if we could get the experiences of a great many users of calcium chloride cooling solution. This solution is now being sold by several of the large chemi-

cal works, and it is recommended that it be purchased of them, as they know its characteristics in respect to neutrality and the quantity required per gallon of water. If this solution is used, a gasoline automobile may be left out of doors indefinitely in any temperature which occurs in this climate, without the least injury. The users of steam vehicles are not so fortunate in regard to immunity from danger of freezing during the intense cold. Wrapping of pipes is of some avail, but the problem is far from being solved.

FROST AND TIRES.

There is a generally credited belief that rubber is more subject to deterioration when used in cold weather than in warm. Probably this is true, but one would like to know upon just what experimental data the belief rests. One thing is certain, that the frozen ground upon which tires are required to run during the winter season brings about very excessive wear. A run over country roads with their frozen ruts is equivalent in point of tire wear to many times the same distance during the summer season. If much speed is attempted it is at the almost total sacrifice of the tires, especially if the machine be a heavy one. We have altogether too little data upon all phases of the winter use of automobiles, but it is especially true in relation to the tire problem.

Hunting by Automobile.

We are now at the height of the hunting season, hence the question is timely again whether the automobile is suitable for hunting purposes. The illustration herewith shows that it serves at least one purpose in connection with hunting—that of transporting the bagged game home. The photo shows a deer killed by Capt. M. Ed Wilson in South Carolina on August 13 last, and transported by him to Beaufort, S. C., in his automobile. Like all enthusiastic sportsmen, Captain Wilson is particular about stating the weight of the animal he laid low, which will be seen marked on the photo.

Calendar of Automobile Dates and Events.

- November 26—Eagle Rock Hill Climbing Contest of the Automobile Club of New Jersey.
- December 10 to 25—Paris Automobile Exhibition.
- January 15 to 23—Madison Square Garden Automobile Show.
- January 23 to February 4—Brussels Show.
- February 6 to 13—Chicago Automobile Show.
- February 12 to 24—Crystal Palace Show, London.
- February 15 to 20—Detroit Automobile Show.
- March 6 to 12—Buffalo Automobile and Sportsman Show.
- March 19 to 26—Agricultural Hall Show, London.



HUNTING BY AUTOMOBILE.

LESSONS OF THE ROAD.



An Automobile Trip to Newport, Boston and the Berkshire Hills.

By ELSIE HUGHES JONES.

Last spring my father, brother and myself decided to take an auto trip during August or September to Newport and Boston, returning by way of the Berkshire Hills of Massachusetts. None of us being fond of conventionality, we conceived the plan of camping out in the automobile, in order that we might be more independent and stop where we found a suitable place, instead of hurrying on to a large city before the shadows of night fell upon us. In order to do this we decided to take with us, for convenience and comfort, a gasoline stove and small refrigerator, which we carried on a shelf secured to the outside of the car. We also took a liberal supply of provisions and the necessary cooking utensils. It was necessary for us to carry two dress suit cases for our clothing, there being three in the party. We also took a number of wraps and blankets, as we anticipated some cold weather, it being September and we were to travel farther north.

The touring car is a special one, is very large, weighing 3,400 pounds, and has several unique features. As we were going so far from home we deemed it best to take with us a great many tools, as well as bolts, screws, rope, two extra springs, six extra dry cells and many other things that we might need in case of a breakdown.

Having everything in readiness, we left our home at Overbrook, a suburb of Philadelphia, early Monday morning, September 14, and reached Stamford that evening. As we passed through New York city we purchased ice for the refrigerator and fresh meat for our supper and breakfast. After passing through Stamford we looked for a secluded spot where we might camp for the night, and, finding one, we proceeded to cook our supper, which consisted of beef-steak, fried beef, boiled potatoes, sweet corn, bread and butter, salted almonds, olives and candy.

Each of us had special duties, according to our several abilities. My brother assumed the responsibilities of chauffeur and mechanic; my father acted as assistant mechanic, packer and horse tamer, and as I was the only girl in the party, the duties of the culinary department naturally fell to my hands.

After eating our supper we felt quite ready for a night's rest in the auto, so retired at 8:30. One of us slept on the front seat, one on the back, and the other on a board running across the backs of the seats, made with a hinge in the centre, so that it might be folded in a convenient form to carry when not in use.

We found the mosquitoes very bad along

the Connecticut coast, but had provided ourselves with mosquito netting before leaving home, and consequently were somewhat protected from this annoyance.

We arose early Tuesday morning. My father and brother changed one of the springs in which two leaves were broken, while I cooked the breakfast, after which we proceeded on to New Haven, Conn., where we went to a spring factory to have the broken leaves replaced. Having to wait about three hours for them, we occupied part of the time in having the gasoline tank filled and in replenishing our stock of provisions. After going back for the spring, we started on to Connecticut River Village, where we took the ferryboat across the Connecticut River. The boat was very small, so that one vehicle like ours was quite enough for it, and we were the only passengers. We then went on until we found a suitable place to camp for the night, and to our chagrin found the mosquitoes were quite as bad there as the previous night and continued their work long after the darkness had vanished in the morning.

After cooking a good breakfast Wednesday morning, we left early for Narragansett Pier, going over some soft, bad road between New London and the latter place, which we reached about 5 o'clock, only to find that we would have to wait two hours for the ferryboat, and then there was some uncertainty about its coming, as the regular ones had been taken off for the summer. The boat did come, however, and the wind was blowing a gale, so that Narragansett Bay was very rough. One could scarcely walk on the boat, and my brother, fearing the car might go off, sat in it and held the brake lever, although the wheels were well blocked. We reached Jamestown, on the Connecticut Island, in about 20 minutes, and went to the Gardner House, which we found to be a very pleasant hostelry and well equipped for the accommodation of automobiles.

Thursday morning we took a ride in the auto along the coast, going the entire length of the island. On the upper part of the island the only indication of a road was the fact that the grass had been mown recently.

After waiting one hour for the ferryboat to cross to Newport, we reached there in about 15 minutes. We first went to the electrical works to have the ignition batteries charged and take gasoline, after which we took the magnificent "Ocean Drive" in the auto and rode around some of the principal places of Newport. In the afternoon we went over the famous "Cliff Walk," which was most beautiful, and which we thoroughly enjoyed, notwithstanding the fact that it began to pour rain soon after we had started, and we were thoroughly drenched, but as that was the only rain we had in the whole two weeks we felt reconciled to our fate.

After spending the night in Newport, we left Friday morning for Boston. We found part of the road between Newport and Boston very good, but on approaching Fall River the road was quite bad, while from Taunton to Boston it was very good again. Reaching Boston, we went to the Thorndike Hotel on Boylston street, which we found most pleasant, and where we remained for three nights.

Saturday and Sunday we spent in seeing the principal places of interest in Boston, which were many.

We left Boston early Monday morning, turning our faces homeward, but going in a circuitous route by the Berkshire Hills of Massachusetts, through Cambridge, where we passed Harvard University, Emerson's and Longfellow's homes, and Mount Auburn Cemetery. We also passed through the towns of Arlington, Lexington and Concord. At Concord we took in a guide to point out the principal places of interest, some of the most important of which were Hawthorne's, Emerson's and Louisa M. Alcott's homes, the graves of Hawthorne and Emerson, and the bridge of the first fight of the Revolution.

We then proceeded on until we reached a place about 20 miles from Greenfield, where we found a delightful, secluded spot in which to camp for the night. We cooked supper, and to our great satisfaction found that there were no mosquitoes. It was quite cold during the night, even though we had all the curtains down and the glass front closed, so we brought the gasoline stove inside the auto, which soon made it quite warm and comfortable.

Tuesday morning we started early for Greenfield and Shelburne Falls. After passing Greenfield the scenery along the valley of the Deerfield to the east end of the Hoosac Tunnel was very beautiful. From there we went to the summit of the Hoosac Mountain near Florida, where the elevation is 2,200 feet, making a rise of 1,400 feet in 2 miles, which made it seem a steep climb. After reaching the summit we unpacked our cooking utensils and camped there for the night.

Wednesday morning, rising early, we had the full benefit of the sunrise, which is something never to be forgotten. After attending to the culinary duties, we went for a walk down the valley of the Deerfield. My brother walked to the end of the Hoosac Tunnel, but my father and I, not being so persevering, soon turned back and walked up the mountain again, which was quite enough for us. After my brother's return we started off once more, descending about 1,400 feet to North Adams, after which we went up Mount Greylock, which is the highest peak of the Hoosac Mountains, being 3,500 feet above sea level. We went up to an elevation of 2,700 feet in the auto and walked the remaining 255 miles, which seemed a very steep, hard walk; but when we reached the summit we were amply repaid for our labors by the wonderful view,

ranging from the Catskills to the distant Adirondacks, with the beautiful valley smiling at our feet.

In descending the mountain seemed even steeper than ascending, some of the curves being very sharp, with tremendous precipices below. Reaching the foot of Mount Greylock, we went to Williamstown, where we stopped at the Greylock Hotel for the night, which we found very attractive and also well prepared to accommodate automobilists.

We left Williamstown Thursday morning for Hudson, passing through Pittsfield, Lenox, Stockbridge and Great Barrington, and reaching Hudson about 5 o'clock, where we went to a hotel for the night.

Friday morning we started for New York. Soon after leaving Hudson one of the back tires came off, and the other a short distance from New York, so that we were obliged to run 120 miles minus one back tire and part of the way with both off, which made us rather anxious as to the fate of the wheels. However, we reached New York safely that evening without other mishaps. After finding a place to store the auto, we went to the Netherland Hotel, where we were very comfortable for the night.

The next morning we had new tires put on, and started for home in the afternoon, reaching home very late that day, after a most delightful trip of two weeks, covering a total distance of 849 miles by the cyclometer.

In ending this account of our trip would say that we found camping out part of the time to be so satisfactory that we expect always to go prepared to do the same on future automobile trips, which we hope may be many.

Thoughts Suggested by Twenty-seven Months' Use of an Automobile in Medical Practice.

By F. K., M. D.

The increasing popularity of the automobile, as witnessed by the fact that every automobile factory is behind orders, would seem to prove that there is a pressing need for these vehicles, and that in spite of their many drawbacks they are vastly superior to horses, either in affording recreation and pleasure or in accomplishing necessary work rapidly.

FOR PHYSICIANS' USE.

Over two years of experience in the use of the automobile has convinced me that for physicians' use, it is time is an object of value, the automobile is a necessity. Of course, if necessary visits are confined to a very short radius, "Shanks' mare" and the trolley are amply sufficient, and the cheapest mode of locomotion. If more work and "style" are required of the doctor, a hay motor—commonly called a horse—may be most suitable; but if a large area is to be covered, in seeing either a few or many patients, the automobile is the conveyance

par excellence, especially in very hot weather. This fact is so well known that a tremendous demand exists for automobiles of the runabout pattern, with which manufacturers are unable to cope. This creates a condition unfortunate for the user or "mobilitist" (to coin a word). He must accept the machine as made by the manufacturer, who refuses to make any changes, however trivial, in the construction of the mechanism or running gear. Secondly, he must await their good pleasure in the replacing of parts that are broken, which usually takes a much longer time than should be necessary, and I have been told of one manufacturer's agent in my city who refuses to sell parts of the engine unless he is permitted to do the repairs (at a high price). Thirdly, the science of automobile building is still progressing rapidly, leading to frequent improvements, and last year's machine is antiquated. The improvements are usually not directly applicable to the old machines, so that the old car cannot be brought up to date.

It is a decided disadvantage to be compelled to learn the kinks of a new machine each year, and I am loath to part with one that has done good service for over two years and bids fair to last a good many more years if the manufacturers will continue, as they have done in the past, to supply the minor wearing parts as needed. I am told, however, that as soon as the present supply of parts is sold no others will be obtainable. This means the special machining of such parts that wear out or break.

NOT MUCH TROUBLE.

I am frequently asked "Do you have much trouble with your automobile?" and often answer, "No; not much." This reply is susceptible of various interpretations. The word "trouble" means different things to different people. One man will consider it a great trouble to ride a bicycle a few miles, or to climb a mountain on foot; whereas another man will feel satisfaction in being thus inconvenienced, and rejoices in the ability to overcome obstructions. Difficulties will be met by everyone that uses an automobile.

The greatest source of provocation perhaps is the pneumatic tire. Months may elapse without any trouble, when suddenly you have a series of intermittent bumps, and you feel the machine drag and lose the buoyancy which is its greatest charm and characteristic. The sooner you stop to investigate the less repairing will you find necessary to the punctured tires.

SOME TIRE EXPERIENCE.

Recently, after going a short distance from home, I heard and felt the characteristic bump, but persisted in running the machine a short distance—one-eighth of a mile—farther, at which place I desired to stop to see my patient while my man repaired the tire. A large iron nail, 3 inches long, had penetrated the outer shoe and inner tube and entered the opposite side, making about twenty perforations in the inner tube, in addition to causing a long tear in the

same. Fortunately, I always carry a pair of extra inner tubes, which limits the loss of time to from ten to fifteen minutes, the time necessary to replace the inner tube.

"It never rains but it pours" is a true adage in automobilism. The next day a tire became flat, and it was found that the great heat of the sun and asphalt had melted the rubber solution used in a previous repair, and allowed the patch to move. The following day, after traveling a good many miles, two tires became deflated at the same time for the same reason. Then the proper remedy was adopted. Inner tubes with a number of patches are good enough in the winter time, but in the summer get new tubes, or have the old ones vulcanized in the punctured places. Since doing this my tire troubles have temporarily ceased.

THE CONTACT SPRING.

Another source of difficulty in my machine is the ignition contact spring and adjustment screw, operated by a cam on a countershaft. For a long time I was troubled with the contact points of platinum being burned by the passage of the electric current, the oxidation of the platinum preventing further passage of electricity, causing stalling of the machine. When the platinum points were again made smooth, the machine would go a short distance and the same procedure would be required. I accidentally discovered that by bringing the terminal points of the spark plug closer together, this burning of the vibrator spring ceased.

I have lately made a plain make and break contact, operated by the cam on the countershaft, which I use instead of a vibrating spring, in connection with a vibrator coil instead of the plain coil. This has given me vastly more satisfaction than I had ever had previously, as the machine nearly always starts on the first compression.

PRECAUTIONS AGAINST FREEZING.

With the difficulty of tires and electric ignition eliminated, the present types of automobiles would closely approach the ideal. In the winter time air cooling is of great value when long stops are made, or when there is no heat in the stable. In spite of the fact that care is taken to thoroughly drain the water from the ordinary radiator, enough water remains to freeze and block the circulation of the water when the engine is started next day. The addition of glycerine to water makes a mushy ice, which is quickly swept away by the circulating water, thus greatly diminishing the nuisance.

In thus detailing the troubles of the automobile, let it not be understood that these annoyances are constant in character. They are not. And if good, intelligent care is given to the machine they are easily remedied.

COST OF OPERATION.

The advantages and pleasures of riding an automobile are so self evident that they need no explanation. The expense of operating a car depends so much upon individual operators that it is impossible to

give a correct estimate. If the operator is averse to getting his hands dirty occasionally, and does not employ an expert chauffeur to make repairs, or at least one who can make them under the owner's direction, the running of an automobile will be somewhat expensive if great distances are covered, especially over rough city streets. If, on the contrary, the operator has lots of time, and becomes thoroughly familiar with his machine, he need not be an expert machinist to reduce his expenses to a minimum.

The most expensive repairs (outside of those made at repair shops, which are always charged for at more than reasonable rates) are to pneumatic tires. I have never had one tire wear the rubber to the canvas backing. It is impossible to ride through our city streets without having the rubber portion of the outer shoe cut, though not always punctured, by the pieces of glass, broken bottles especially, with which the streets seem to be literally covered at times. There seems to be no enforcement of the laws relating to the throwing of such rubbish into the street since the L. A. W. has ceased to be a power.

TIRES A HAZARD.

A tire may be run but a single day and have a number of deep cuts. Should a defect arise in the canvas of a double tube tire, causing a big swelling to appear on the tire, which will shortly burst with a loud noise, the manufacturers make an excuse of the number of cuts, and say the tire is worn out. The rubber covering of the canvas may still be nearly as thick as upon a new tire, but this is apparently no guide. The recent advance in price of 25 to 33 per cent. will not bring the tire question any nearer solution. At the price of rubber in the past

twenty-seven months, the tire cost per mile has been 1½ cents.

The entire cost of running my machine, including the hire of a man the greater part of the time, is \$2.319, allowing for depreciation, based upon an estimate of the market value of my machine and equipment at the present time. This makes the cost a trifle less than \$86 per month, and covers between 8,500 and 9,000 miles, almost entirely within city limits, making each mile cost about 26 cents. This does not include any storage charges, as I have a shed upon my premises for this purpose.

COST PER MILE.

Allowing for work done by hired man other than upon automobile, and not counting interest upon money, depreciation and storage, the cost of running is reduced to \$1.407—\$52.11 per month, or 15.63 cents per mile. This I consider a low estimate and as low a cost as that at which a horse can be driven a daily average of 10 miles. In fact, only one who has a thorough knowledge of his machine and its repair can keep his cost down to this figure; but anyone with ordinary intelligence and an earnest desire to learn can master a gasoline automobile in a reasonable length of time. It means, however, frequent dirty hands until a helper can be taught to do the work under the owner's direction.

The above figures are rather understated than overrated, and are as nearly exact as possible.

In conclusion, I must join the great majority of automobile owners in saying, "In spite of thy faults, I love thee still," my inanimate but fleeting steed.

The Bray Technical School of Ireland has started a class for motor mechanics.

NEW VEHICLES AND PARTS.

The Twenty-four Horse Power Peerless Touring Car.

The Peerless Motor Car Company, of Cleveland, have just completed the first of their 24 horse power four cylinder touring cars. This model, like those previously built by the Peerless Company, is of the so called European type, i. e., it has a vertical motor in front, clash gear transmission and a conical clutch. Most of the distinctive features of Peerless construction have been retained, such as bevel gear drive and the arrangement of the change gear, but the car is thoroughly up to date in all those features in which advances have been made during the past year which are generally recognized as such. These features include mechanically operated inlet valves, cellular cooler with fan, and pressed steel frame construction.

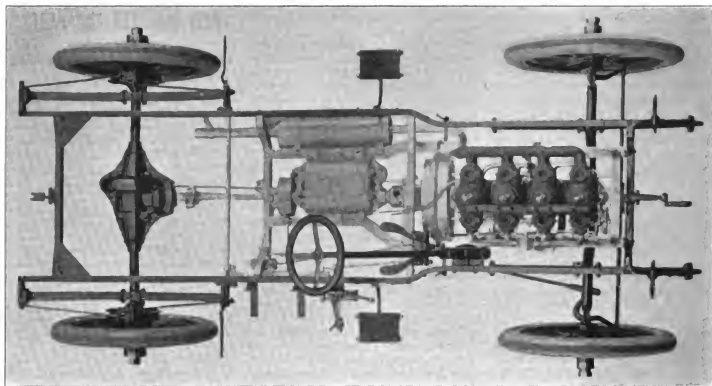
THE RUNNING GEAR.

The wheel base is exceptionally long—92 inches—and the tread is standard. The car is equipped with 34 inch artillery wheels with twelve hickory spokes each. The wheels are shod with 4 inch clincher tires. Both the front and rear axles are equipped with anti-friction bearings. The front axle is tubular, with drop centre and Elliott steering pivots of unusual length. The steering pivots are provided with grease cups, as shown.

The running gear frame is supported by semi-elliptic springs both in front and rear, and as the shaft drive avoids the necessity of chain adjustment the rear springs are connected to the frame by spring shackles at one end only (rear end), the same as



PEERLESS TWENTY-FOUR HORSE POWER FOUR CYLINDER TOURING CAR WITH ALUMINUM BODY.



CHASSIS OF PEERLESS TWENTY-FOUR HORSE POWER TOURING CAR.

the front springs. Contrary to usual practice, the shackles on the front springs are located at the forward end.

The running gear frame is of pressed steel, with spring horns riveted on. The frame is 34 inches wide in the rear and narrowed down 6 inches in front. The engine and change gear are supported on an angle steel false frame 7 inches lower than the main frame. This false frame is shown very plainly in the plan view of the chassis herewith.

THE MOTOR.

The motor is the part of the car in which the most radical changes have been made over the previous model. Each cylinder is cast separate and bolted down to the aluminum crank case. The valve chambers for inlet and exhaust valves are located on opposite sides of the cylinder and are cast integral with it, the same as the cylinder jackets and heads. The exhaust valves are located on the left hand side and the inlet valves on the right hand

side. The valve springs are of very large diameter and their lower end is slipped through a hole in the exhaust valve stem, a feature this motor has in common with the Mercedes motor. The cams operating the valves are enclosed. The two cam shafts on the respective sides of the engine are identical and are driven by noiseless fibre gears. The exhaust valve shaft drives the circulating pump positively through spur gearing. The ignition commutator is placed on the inlet valve cam shaft. The



VIEW OF MOTOR IN POSITION, FROM INLET VALVE SIDE.

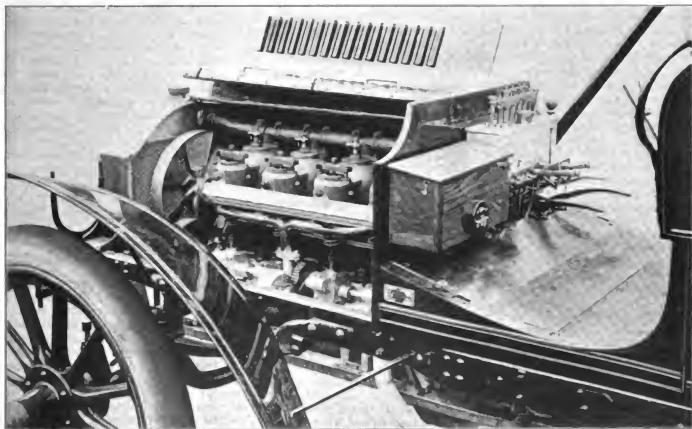
cam shaft gears are surrounded by a sheet metal housing.

The carburetor (float feed, spray) is located on the inlet side of the motor and connects through the throttle valve to the different inlet valve chambers. All joints in the piping of the car (for mixture, exhaust and water) are flanged joints. The throttle valve is controlled by a centrifugal governor built together with the inlet valve cam gear, but it can be completely opened by means of an accelerator lever convenient to the driver. The governor lever is pivoted at the end of a rod extending horizontally forward from a

The cellular cooler at the front of the bonnet forms a radiator and water tank combined. From the bottom of this cooler the water flows to the positively driven centrifugal circulating pump, and from there through a manifold into the lower end of the different cylinder jackets, on the exhaust valve side. The water leaves the jackets on top and returns to the upper part of the cooler through a rubber hose connection. The total water capacity, including that of the jackets, is 6 gallons. The pump is located at the lowest point of the system, which permits of perfectly draining the system of water.

justable. The feeds to the four crank chambers can be shut off all at once. The differential gear, universal joints and rear axle bearings are packed with grease and require only little attention.

The conical clutch is engaged by a spiral spring between the hub of the clutch cone and the hub of the engine flywheel, and all endwise pressure of this spring is taken up at the clutch friction surface. The clutch is of the so called inverted type, the female part being a ring with internal taper friction surface, which is bolted to the flywheel rim. The clutch cone is leather faced and has a very wide



VIEW OF FORWARD END OF CAR WITH BONNET OPEN.

bracket depending from the inlet manifold, as shown. The connecting link between the governor lever and the throttle valve is also plainly shown.

IGNITION.

Ignition is by jump spark, with current furnished either by a dry cell battery or a storage battery. A double throw switch on the dashboard enables the driver to change instantly from one to the other. The spark plugs are screwed into the plug caps over the inlet valves. A separate coil is provided for each cylinder, all the coils being done up in a neat box on the dashboard, and the current is distributed successively to the different cylinders by a commutator on the inlet valve cam shaft, which commutator (as will be seen) is of the enclosed type.

Back of the radiator is located a six blade fan, 15 inches in diameter, surrounded by a circular housing and driven from the engine shaft by a round belt.

The crank shaft of the engine is of the four throw type, and has a short bearing between all of the cranks. These bearings and their supports divide the crank chamber into four different compartments, each of which has a separate oil feed. The lubrication is by a mechanical multi-feed oiler, secured to the dashboard and driven by a round belt off the engine. This oiler supplies lubricant not only to the cylinders but also to the crank chamber and gear case bearings. The wrist pin and crank pin bearings receive their oil by splash. Each of the feeds of the mechanical lubricator is, of course, separately ad-

justable. It is disengaged in the usual manner by pressing on a foot lever.

THE CHANGE GEAR.

The change gear gives three forward speeds and one reverse, and drives directly on the high gear. The power is transmitted from the friction clutch shaft to the first shaft of the transmission by a jaw coupling which prevents all undue pressure on the bearings in case of any slight disalignment between engine shaft and transmission shaft. All the changes of gear are obtained by a simple movement of a single lever, this lever being located just outside the driver's seat. The change gear is enclosed in an aluminum casing which is perfectly dustproof and provided with two inspection doors on top. All the bearings of the shafts in the casing are

chain oiled. The clutch operating mechanism and gear shifting mechanism are interconnected, to prevent the gear from being shifted when the clutch is in engagement.

From the change gear the power is transmitted to the rear axle by means of a telescopic shaft with universal joints, which compensates for all strains on the frame and play of the springs. The bevel driving gears and differential gear are enclosed together on the rear axle. The bevel gears are of steel and hardened. They have coarse pitch teeth and a wide tooth face. They run on ball bearings which can be adjusted to maintain perfect mesh of the gears and compensate for wear.

The drive from the differential to either road wheel is accomplished by squared end shafts working through a universal joint at the differential to a clutch plate on the outer end of the hubs. These shafts are loose in the axle tube, so that any strain the axle may sustain cannot cause the shafts to bind. This construction allows the use of an arched rear axle, stronger than a straight one. It also permits the rear wheels being pitched inward in line with the front wheels, after the manner so long in use with horse vehicles. The wheels revolve on the stationary axle on adjustable ball bearings, therefore there is no load carried on any moving part of the rear axle at any point.

By removing the aluminum cover on the differential and bevel gears, any part of the rear axle can be gotten at for inspection or adjustment without taking the axle out of the car.

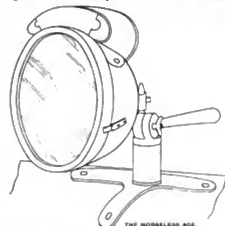
The car is fitted with two entirely independent brakes, a foot brake acting on the transmission shaft and a hand brake acting on drums fixed to the rear wheels. When either of the brakes is applied the clutch is simultaneously automatically disengaged. The handwheel steering is irreversible. The car is equipped with two oil side lights, two powerful acetylene headlights and one tail light, horn, and complete equipment of tools.

Parish & Bingham Pressed Steel Frames.

The illustration herewith shows the stock size pressed steel frame beams of the Parish & Bingham Company, of Cleveland, Ohio. It will be noticed that the beam is of the usual U section, the height decreasing at both ends. The greatest height is 4 inches and the thickness $\frac{3}{4}$ inch. The total length is 11 feet. The forward end is bent inward to obtain a narrow frame.

Dyke's Dashboard Acetylene Light.

The sketch herewith shows a method of securing an acetylene search light to the curved dash of an Oldsmobile in such a manner that the inclination of the beam of light can be readily varied and the lamp



swung from the straight ahead position to either side as may be desired. The acetylene generator for the light is separate; it is secured to the inside of the dashboard, and is connected to the burner by a flexible tube.

Frantz Tonneau Bodies.

The Frantz Body Manufacturing Company, of Akron, Ohio, are manufacturing a type of tonneau body for automobiles which they designate as their "Model W." This body weighs about 200 pounds, and measures 34x114 inches over all outside, and has an ash frame $1\frac{1}{4}$ inches wide, flaring at the bottom to $1\frac{1}{2}$ inches and $2\frac{1}{2}$ inches deep. The separate front seats are 20 inches wide, deep and high, while the tonneau seats are 17 inches wide by 38 inches deep, by 22 inches high.

An extra tonneau seat can be made with the tonneau door as back; also one on each side just in front of the main seats. These seats are hinged and provided with suitable supports and fasteners and can be raised up and fastened when not in use, and are convenient where extra passengers, especially children, are to be carried. When made with removable tonneau the detachable deck lid is made hinged and controlled by two brass handled box locks so that the space in the rear is readily available for rain coats and other luggage. The foot board under the front seats is made from mahogany veneer and is hinged and controlled by a brass flush catch, the entire board being so constructed that it can be removed at will. Both front and tonneau seats are made from solid bent wood without joints.

COMMUNICATIONS



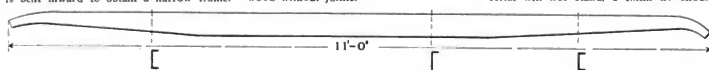
A User's Complaint.

Editor HORSELESS AGE:

Last spring I ordered an auto from one of the oldest makers. I purposely chose one of the higher priced, supposing I would get good work and material. I received it after a month's delay from the time for which it was promised, and found a knock in the engine for which I could get no satisfaction out of the maker. Then I found seven or eight wire nails used as rivets in a pair of secondary chains, which caused a constant stretching, which was corrected by replacing the nails with the proper rivets. Shortly after a bracket on my chain guard broke. Then the steering heads broke off, letting me down on the road. Then the crank shaft showed unusual wear, all three bearings of distance rods being badly scored, as though grooved with a heavy tool.

I now began looking through the machine, and found that every casting was of the same material—soft under the drill, giving a coarse chip and showing a coarse granular surface on fracture. There was only one casting in the whole machine which would pass muster as a fine grained steel casting, and that probably got in by accident.

I have access to another machine of the same make, which I have every reason to believe is of the better metal mentioned last. The bearings are smooth, do not require adjustment often, and give good satisfaction. The machine is now two years old, and has been run at least 1,000 miles, and runs smooth, while mine, which has run a less distance, is a perfect rattle-trap and will not keep still 20 miles. The clatter from the crank case drowns the sound of the muffler. I will say that I am a practical mechanic and have done all my repairs, and while I would like that everything about the machine should be just right, do not expect such a result without constant attention. Had I paid \$600 or \$800 for my carriage I should have expected just the kind of time I have had, but for twice that sum it seems to me that I should be able to get good material and good work. I can easily see that a maker might change his castings for a cheaper grade, as I think was done in this case, but when he finds such material will not stand, I think he should



PARISH & BINGHAM STOCK SIZE PRESSED STEEL FRAME.

THE HORSELESS AGE.

call the machine back and replace and rebuild. He sent me new parts on order, and acknowledged the heads were poor; said one pair broke under him, and he never wanted a repetition of the experience. He sent along the bill, and I paid for it.

The good points of my carriage are that it is very easy over the roads, very powerful and light, a good hill climber, and that I have had no trouble with the engine proper that was not my fault, excepting the knock that I "have with me always," developing every time I turn on more power for a slight rise or a stretch of road. The knock disappears if the engine is opened wide or as soon as the machine gathers way. This knock would have been my only grievance had the castings been of good material, and I should probably have accepted it as my fate.

A. F. U. U.

Why Not Front and Rear Drive for Racers?

Editor HORSELESS AGE:

Is there any reason why a front and rear drive should not be the best type for racing and also for commercial or pleasure purposes? I have a four wheel driver that I built for pleasure purposes, and it works fine. I don't see why it would not work on racing machines, for there would then be no slipping to the drivers, and I don't think the front would slip on the curves, so that faster time could be made with less danger to the driver. My machine drives by all four wheels and steers by the front ones. I have a brake on the front wheels, one on the rear wheels and one on the countershaft. That makes three brakes in all, so that if one gives out I have two left.

OLIVER CLUTS.

A Question of Tire Sections.

Editor HORSELESS AGE:

In the article on tires by Mr. Travis in your November 4 issue a misapprehension apparently exists re the shape assumed by a tire when inflated. Many people imagine that the shape of a tire is determined by the mold in which it is vulcanized, whereas a tire, like any inflated flexible object, assumes a circular section under the pressure of the contained air. It is therefore not possible to make an inflated tire stand, as shown in Fig. 1, regardless of whether it is loaded or not, and the amount of deflection caused by the load will not tend to produce a circle, but on the other hand, tends to flatten the circle. In order to secure an elliptic outline it is necessary to build something ineffective by inflation on the air tube circle. This is done in some tires by thickening the tread at some places more than others, but in all cases the air tube remains a circular section until it is distorted by the application of the weight of the vehicle.

CHAS. E. DURYEA.

Winter Use of Automobiles

Editor HORSELESS AGE:

I notice in your last issue a request that owners storing their machines on their own premises give their experiences as to trouble in starting in cold weather. Having an air cooled car, I have no water to worry over. I store my wagon in a small building in which there is no heat, and in very cold weather the oil in the oil cup gets as solid as maple sugar, and I at first feared I should have to thaw it out with hot cloths, but my last winter's experience has proved that it will thaw itself out in time to care for the engine.

When the thermometer is around 10° I find I have to open the gasoline valve wide and turn the engine over about a dozen times with the compression relieved, then half close it and insert the plug, and almost always the engine goes. I have also noticed that in cold weather I do better with 68 test than 76 test gasoline, but that the odor from the exhaust is very much worse. Is there any scientific reason for this?

E. A. FAIRCHILD.

[It would seem to us that the lighter, 76 test, gasoline should be more satisfactory in cold weather.—Ed.]

Chain Guarantee.

The American manufacturers of chains have adopted the following guarantee:

We will replace such chains as in our judgment show defects in workmanship or material, provided same are returned to us for inspection, transportation charges prepaid.

We agree to prepay return transportation charges to consignee on all replacements.

On account of the various conditions under which chains are used and cared for, we cannot guarantee the certain performance of any chain, and will not replace chains or parts which have been used. Customers should inspect chains as soon as received, and report any supposed defects or complaints before returning same.

Trade Literature Received.

W. R. B. Lockie, 17a South Castle street, Liverpool, England.—"The Universal Transferable Steering Propulsor" (for motor boats).

The Wilson & Hayes Manufacturing Company, Detroit, Mich.—Circular of mud guards (for Fords, Wintons, Olds) and forged irons.

The Peerless Motor Car Company, Cleveland, Ohio.—Advance circular of new 24 horse power and 35 horse power Peerless touring cars.

The F. B. Stearns Company, Cleveland, Ohio.—"The Facts of the Case: A History of the Famous 1903 Endurance Run."

The Post & Lester Company, Hartford, Conn.—Circular of the Volier automobile horns.

OUR FOREIGN EXCHANGES.



Automobiling in the Tropics.

In a recent issue of our German contemporary, *Automobil Welt*, is published an article on automobiling in tropical countries, with special reference to the conditions in Java, by Herr Max Wenkel, who claims to have spent two and a half years on that island as automobile expert. The following is an abstract from this article, which should be of particular interest to American readers, as one of the illustrations accompanying the original article shows Herr Wenkel in an American steam car, proving that American machines have penetrated even to the most distant parts of the world:

The conditions of automobile use in the tropics are entirely different from those in temperate climes, and an automobile built for European conditions can hardly be used in the tropics without radical modifications. The first thing that has to be reckoned with is the hot and moist climate; other factors are the peculiar taste of the Indian public, the road conditions and the fuel obtainable. As concerns the fuel, it should be mentioned that gasoline is produced in Java, but the product is very impure and of varying density; it is entirely unsuitable for spray carburetors, and only surface carburetors can therefore be used in the Dutch East Indies. No particular pains need be taken to secure high fuel economy, as the gasoline is quite cheap, costing from 5 to 10 cents a gallon.

CONSTRUCTIONAL REQUIREMENTS.

The pneumatic tires must be of especially good quality to withstand the climate of the tropics. No European wood must be used in the body construction, as it would soon be destroyed by various sorts of insects, among which the white ants may be mentioned. The lacquering usual on European motor cars is destroyed in short order by the climate.

It is self apparent that an automobile for the tropics should be provided with protection against the sun's rays. If the vehicle is intended for long trips into the country several other conditions must be observed. In the first place, the tread must not be wider than 50 inches, for in some places very narrow streets and suspension bridges must be passed which do not admit of a wider vehicle. This applies particularly for Sumatra. Besides, the weight of the vehicle should not exceed 550 pounds. Many small brooks are only bridged with bamboo mats, and many larger rivers must be crossed on bamboo floats, which would sink if the automobile was heavier than the weight above specified.

The vehicle must have plenty of storage room for touring necessities, such as a

supply of imperishable food (preserves and mineral water), mosquito netting, much clean linen, rubber tires, etc. It is, of course, understood that the total supply of gasoline necessary for the whole trip must be carried along, or else gasoline stations established in advance.

During the rainy season the roads, with the exception of a few main military roads, are hardly passable. But during the dry season all the roads, especially in Java, are in very good condition for automobile traffic. The streets in the larger cities, such as Batavia, Surabaya, Solo and Bandaeng, are excellent, as they are very wide and have a firm surface of cement or asphalt.

OBTAINING DRIVING PERMITS.

The reader may be interested to learn what an amount of red tape is connected with the obtaining of a driving permit. First of all, application must be made to the proper authorities representing the capital of the province in question, such as the Provinces of Batavia, Preanger, or Solo. These provinces are mostly of such size that one may drive through them in an automobile in a few hours. At the frontier of the new province a new permit is required. Herr Wenkel remarks that the conditions in Java are therefore even worse than those obtaining in the United States of America.

In the application must be stated the length, width and height of the car, as well as the number of seats, the weight of the vehicle and the horse power of the motor. After some four or five months, but probably even later, one receives notice to have the car in readiness at a certain hour for an expert examination.

In Batavia, for instance, the official appointed by the Government is the engineer of a steam crane company, who has no notion of the automobile and the explosion motor. This expert, after having walked around the car a few times and posed some very cautious questions, declares the machine to be admissible to public road traffic. But the happy owner is still far from being allowed to drive. The examining official first reports to the authorities that the machine is in good condition. After several months have passed another official appears on the scene to determine the driving skill of the owner. If this examination turns out to the satisfaction of the exalted authorities, another several weeks pass, when finally the driving permit is delivered. However, the owner is still unable to drive, as the authorities have first made an identification sign of the size of an oven door, which contains in large black letters the name of the province—Meesterkeronnelis, for instance—and below that the registration number. After having paid \$10 for the examination, and an additional \$5 for stamps and clerical expenses, the right has been acquired to drive on the left hand side of the road at a speed of 7.2 miles per hour.

SIGNAL BELLS REQUIRED.

It is worthy of note that the automobile must be provided with a bell, as a warning signal, while horse carriages, two wheeled carts, private carriages, trucks and delivery wagons carry horns. In the larger cities, as nobody walks but everybody rides, there is an enormous vehicle traffic, and, consequently, an uninterrupted ear-rendering concert of noises.

In other cities of the same province the regulations are different. In one city, for instance, an automobile owner, upon making application for a driving permit, was asked to present one front wheel and one rear wheel for examination. After a few days the wheels were returned to him with the remark that everything was in order. In Sumatra the authorities simply appointed a road inspector to the post of automobile examiner.

Recently, however, the regulations in Java have become much more lenient, and one of my friends was given a driving permit free of charge, after a short examination as to his skill in driving and without examination of the vehicle.

NATIVES FRIENDLY TO THE AUTO.

Finally, I would mention that the inland population is notable for its very willing and polite inners toward automobile tourists. Upon a wink they are ready to render any assistance. Running over chickens and dogs can, unfortunately, not always be prevented, but the damage is always easily repaired, as the value of a chicken in Java is only about 5 cents. The dogs, like all domestic animals in the tropics, are awfully lean and lazy, and can only be driven from the road with a whip or with kicks.

Drives during the evening are not feasible, owing to the multitude of insects; it is not practicable to use a glass front, as the draft is necessary in the tropics. Night drives are not to be recommended, as after night breaks the atmosphere is moist and unhealthy.

Improved Spring Steel.

A recent patent granted to Fried. Krupp, of Essen, relates to steel suitable for the construction of springs, and has for its object, by a special composition of the steel, to simultaneously increase its tensile strength, elasticity and toughness, in comparison with other well known kinds of spring steel, so that a greater working capacity of the spring may be attained without increasing its weight. The first class Martin and crucible steels hitherto employed for the construction of springs possess a strength when hardened of not much over 79 tons per square inch, with an elastic limit of about 63 tons per square inch.

The necessity has recently arisen for the construction of springs of steel which shall be capable of being subjected to considerably greater demands than the usual Martin and crucible steels hitherto em-

ployed for this purpose. To meet this necessity the spring steel, according to Herr Krupp's invention, is produced, containing 0.4 to 1 per cent. of carbon, and a comparatively large amount of silicon, say between 1 and 4 per cent., added to it. The raw material may be quite ordinary Martin steel, to which the required silicon is best added in the form of the cheap ferro-silicon prior to casting. Experiments have proved that steel of this composition, when hardened, possesses an increased strength of about 14 tons at the elasticity and breaking limits, and may consequently be subjected to greater demands than the usual spring steels. The steel also shows a fibrous structure where fractured resembling wrought iron, a sign of its great toughness. These advantages are obtained with quite a trifling increase in the cost of the ordinary steel, so that in the silicon steel a material is obtained which is well suited for the construction of springs.—*The Mechanical Engineer.*

The Gailion Hill Trials.

The attempt to lower the record for the kilometre with a flying start up the famous Gailion Hill of Sainte Barbe on Sunday, November 8, had attracted no fewer than eighty-eight entries. Before the start, which was fixed for 9:30, M. Deujean, who did the best time for the kilometre in the light automobile class—viz., 30.45 seconds, November 5, at Dourdan—decided to make some trial trips in his Richard-Brasier car, a very injudicious proceeding, as the thick fog made it impossible to see more than a few yards ahead.

He went up and down the hill without accident, but when he was ascending it for the second time he suddenly saw M. Brasier on another car of the same make right ahead. In order to avoid crashing into the automobile in front, M. Deujean swerved off to the side, but the speed at which he was traveling sent him with frightful velocity into a tree. The machine was smashed to pieces, and M. Deujean was thrown about 40 feet. His chauffeur received only slight injuries.

Two hours later another fatal accident, even worse than the first, occurred at Bonnières, some little distance from Gailion. Five mechanics in the employ of the Gardner-Serpollet Company were on their way to the contest in an automobile. While going down a hill near Gailion they came upon another Serpollet car at a turning. As in the previous case, to prevent a terrible collision, they turned abruptly to one side. The same fate attended them. The car was dashed against a tree and overturned. Two of the mechanics were killed instantly, and another was seriously injured, both legs being broken. Of the other two occupants, one was slightly injured and the other escaped unhurt.

The races themselves passed off without

accident. The fastest time for the flying kilometre was made by M. Rigoly in the heavy car class, who did the distance in a Gebron-Brillie motor car in 33.35 seconds, or at a speed of 107 kilometres (about 67 miles) an hour. The previous record was held by M. Le Blon (Gardner-Serpollet), with 36 seconds.

Among the entries was one English car, a 50 horse power Wolsley, but it met with very bad luck. It was one of the last cars to start in the class for heavy cars, and just after starting the Renold chain used for transmitting the power from the engine to the change gear broke. A new chain could not be fitted in time.

Harkness' Racer.

A French contemporary prints an illustration of the racer built by H. S. Harkness, which, with its 11 foot wheel base and enormous bonnet projecting in front of the steering wheels, presents a very formidable appearance. Mr. Harkness was encountered by a representative of our contemporary just as he entered Paris, after completing a trip from Bordeaux, which trip of 360 miles was said to have been made in seven hours. The following information regarding this car which our contemporary was able to obtain will probably be read with interest (and perhaps wonderment) by our readers: The motor develops 120 h. p.; it has both jump spark and contact spark ignition, and the inlet valves may be operated either mechanically or automatically. The motor is located at the middle of the chassis, which gives the vehicle great stability, and admits of turning corners at high speed without skidding. The change gears are constructed of a special alloy, as strong as steel, but much lighter, the whole gear, including the differential, weighing only 130 pounds. The gear gives three forward speeds and one reverse, the drive on the high forward gear being direct. The change speed pinions are smaller in diameter than a 5 franc (dollar) piece. The first forward gear gives a speed of 35 miles per hour; the second a speed of 70 miles per hour, and the third a speed of 108 miles per hour. The frame is constructed of armored wood and clears the ground by only 10 inches. The gasoline tank has a capacity of 50 gallons; the weight of the car complete is 2,170 pounds. The car has been shipped to New York, and it is said to be Mr. Harkness' intention to enter it for next year's Gordon Bennett race.

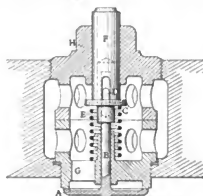
Phillips Improved Inlet Valve

An improved method of operating and controlling the inlet valves of internal combustion engines has been designed by Robert E. Phillips. The essential feature is that, instead of mechanically operating the valve to open it against the pressure of a spring which keeps it on its seat, the pressure of the spring on the valve is

mechanically released in advance of the time when the valve should open, so that during the latter part of the exhaust stroke the valve is retained on its seat by the pressure of the exhaust alone. As a consequence the valve opens as soon as the pressure in the cylinder approximates to that of the inlet pipe, the valve opening either by gravity, if it opens upward, or by a light spring if it opens downward.

The accompanying drawing shows the arrangement as applied to the inlet valves of Mr. Phillips' Rochet engine. The only alteration in the valve consists in the use of a heavier spring and in the employment of a cotter with a deeper shank, so that the travel of the sleeve washer over the stem of the valve never uncovers the said shank, the cotter being thus unable to shift out of place. Mr. Phillips has thoroughly tested the valve, and finds it most satisfactory.

In the locking cap H which holds the



PHILLIPS INLET VALVE.

seat G of the valve A in position is a plunger F which engages the sleeve washer C on the stem B of the valve, the plunger being recessed to clear the end of the stem of the valve, and slotted to clear the cotter D. In fitting this arrangement to the Rochet-Schneider engine, the necessary motion to operate the plungers F was obtained from the exhaust cams, the motion being taken off at an angle of 90 degrees to the lifters of the exhaust valves, so that the pressure on the springs is removed from the valves considerably in advance of the end of each exhaust stroke; in fact, as far in advance as the exhaust valves open in advance of the end of the working strokes of the piston.—*The Autocar.*

The war between the mayor of Brussels and the motorists of that city continues, and at present the victory lies with the mayor. On appeal the Correctional Tribunal of Brussels has reversed the decision of the police court judge, who held the mayor's regulations requiring automobiles to proceed at a walking pace in certain crowded spots to be illegal, and dismissed all cases brought against chauffeurs under it. The Correctional Tribunal, in upholding the mayor's regulations, imposed a fine of 5 francs on each of the

chauffeurs against whose acquittal at the police court the Procureur de Roi had appealed. The Automobile Club is expected to continue the case.

The French Government has decided to participate officially in the exhibition of the alcohol industries at Vienna in 1904.

A motor bicycle club, the Motocyclette Club, has been organized in France. It insures its members against damages done to outside parties.

The firms of Daimler, De Dietrich and Benz have notified the German General Commissioner that they intend exhibiting at the St. Louis Exposition.

In the 1,000 kilometre endurance contest for motor bicycles, under the auspices of the A. C. F., which started on November 9, thirty-one competitors started.

It is rumored that Williams & Robinson, the well known English firm of high speed steam engine builders, will manufacture Mercedes cars in England.

We learn that Duryea cars will hereafter be constructed complete in England. The cars sold by the English Duryea Company to date were of American manufacture.

The Belgian consul in Cuba informs his Government that the island will be an excellent market for light cars of about 10 horse power, which should be strongly built and moderate in price.

In a racing motor bicycle which competed in the recent Dourdan speed trials the handle bar was directly attached to the crown of the front fork and extended backward horizontally to permit the driver to lean close to the upper frame tube.

The gala night at the Paris Opéra which has been arranged in honor of the delegates of foreign clubs and French provincial automobile clubs during the Paris Salon has been fixed for December 17. The visit to the Opéra will be preceded by a banquet at the Paris Club.

The Saxon-Thuringian Automobile Club was founded recently, and will have its headquarters at the Hotel zur Tanne, Zwickau. Officers were elected as follows: Herr Vogt, Zwickau, president, and Dr. Jungner, Schwarzenberg, vice president. The club will join the German Automobile Association.

One of the rules of the coming Paris Exposition is to the effect that the use of noisy apparatus, such as trumpets and horns, sirens, musical apparatus or any instrument or means of advertisement liable to disturb the good order of the exhibition, is strictly forbidden, under penalty of immediate expulsion.

Brayton's Early Work in Oil Motors.

The Selden patent is now an absorbing topic of discussion in trade and patent circles throughout the United States, and even in England and France. As the engine shown in the patent drawings of the Selden patent is a three cylinder Brayton engine, and as the late George B. Brayton, of Providence, R. I., early applied his engine to traction purposes, some evidence regarding the early work of this inventor, which has recently been brought to light, is of more than passing interest. This evidence shows conclusively that Mr. Brayton in the early 70s fitted an internal combustion engine of his own design to an old horse car and operated it successfully in the streets of Providence, R. I., carrying passengers and, in a measure, proving the practicability of this form of power for such purposes.

As far back as the early 50s Brayton began experimenting with gas engines, i. e., cylinders to which coal gas was in-

March 23, 1871, in which the following items occur:

"Mr. Brayton then exhibited a working model of a compound gas engine, devised by himself, after many years of patient investigation and experiment. * * *

"The power developed in this engine arises from the expansion produced by the burning of a compound of atmospheric air and coal gas or other gaseous fuels. * * *

"Any hydrocarbon vapors can be used."

In comparing the cost of running his engine with a steam engine Brayton says in his pamphlet:

"The foregoing figures are based upon the present prices of gas as furnished by the city of Boston; but when carbon oils are substituted for gas (and they are much to be preferred) the cost of realizing the same amount of power will not equal one-third of the above named rates. When it is proposed to run the motor by these 'oils' instead of the common coal gas a

receptacle containing a small amount of such fluid supplied automatically is attached to the engine, whereby the air is carbonized as it enters the cylinder. The power thus derived is 25 per cent. greater, since the vapor of these oils is moist and more expansive than the common gas, which is invariably dry."

After enumerating various uses to which the engine is applicable, a final heading of "Miscellaneous Purposes" is given, and thereunder are noted "Pleasure Yachts of Certain Tonnage,"

"Pumping Air for Ventilation, Horse Cars," etc.

The Brayton oil engine was first used for traction purposes in 1873. It was applied to a horse car belonging to the Union Railroad Company, of Providence, R. I., at their shops in Olneyville, operating between Cranston street and the Narragansett Trotting Park. Several gentlemen who were then officers of the Union Railroad Company are still living, as also a number of employees of the company who worked upon the car to prepare it to receive the motor.

Perhaps the following account, reprinted from the Providence *Journal* of February 3, 1893, by the courtesy of its technical ed-

itor, will best describe the above noted usage:

"UNION RAILROAD.

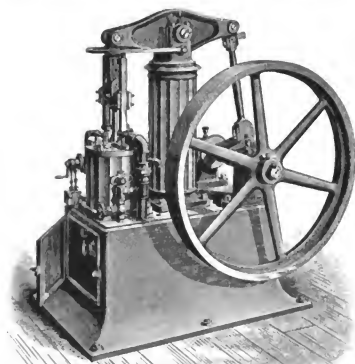
"Referring to the trial of an engine on street cars in Providence, Mr. Longstreet said that twenty years ago he seriously considered the idea of discontinuing the use of horses. This was because of experiments he had witnessed with an engine running on naphtha gas and air. A contract was made in January, 1873, with Mr. George B. Brayton, the inventor, in which he agreed to build an engine of suitable size and shape for propelling a car. An amendment to the charter of the Union Railroad Company was obtained by the terms of which towns and cities were enabled to grant it permission to use any motive power. It had previously been confined to the use of horse power. By numerous experiments Mr. Brayton convinced Mr. Longstreet that naphtha was not dangerous if handled under proper conditions; that settled, it seemed that the rest was easy. An upright 4 horse power machine was selected. It occupied precisely the same location and space that are commonly taken up for stoves in street cars. There was a water jacket around the cylinder which was cased with hardwood. A condensing coil was out on the roof, a 5 gallon can of naphtha was under the seat, with an air pump near it which pumped into a tank under the floor of the car. The power was transmitted by gears, and controlled by a lever at each dasher rail, so graduated that a speed from a crawl to 15 miles an hour was possible. When everything was ready it was found that 4 horse power was not sufficient. It would hardly 'take up the slack,' so to speak. The next machine was 12 horse power, because that was as big a machine as could be got into the space. The early experiments gave very gratifying results. To make a long story short (for the experiments extended over a period of eighteen months), it was decided that in order to get traction for ordinary grades, and to meet the usual and unusual conditions of the track, the car would have to be very much increased in weight, and that nothing less than 40 horse power to a car would give assurance of success. It was not feasible from a commercial standpoint. There were things which 5 cents would buy, but this was not one of them."

No drawing or engraving of this autocar appears to be in existence, but those who worked and rode on it remember its salient features.

The *Scientific News* of March 1, 1898, published by S. H. Wales & Son, contained on its front page an illustration of a Brayton petroleum engine of the beam type (reproduced herein), also the following descriptive matter:

"THE BRAYTON PETROLEUM ENGINE.

"We herewith present to our readers an illustration of an engine that has lately attained a great deal of prominence, and is steadily forcing its way into public favor.



THE BRAYTON OIL MOTOR.

roduced under pressure, and from 1864 up to the time of his death in 1892 he was engaged in building and exploiting engines of that and the more advanced petroleum type. Just when he commenced building oil operated engines is uncertain, but in a printed pamphlet issued in 1872 ample data are contained showing that his ideas had culminated in practice prior to that time. This pamphlet is entitled "Brayton's Ready Motor; a Revolution in Motive Power," etc., and gives the testimony of many practical men as to the effectiveness of the motor.

An extract is printed from the report of the Massachusetts Institute of Technology, published in the Boston *Daily Transcript*.

The feature peculiar to this engine is that it is operated by the products of combustion of any gaseous compound. Petroleum being in the greatest supply, and the cheapest, is the most available material at hand; hence it is at present exclusively employed, but we have witnessed one of these engines operated from the products of the combustion of naphtha, benzene, and even whiskey, as well as of common gas.

"The design here illustrated is the most improved form for burning petroleum, which is injected into chambers provided in the cylinder cover. A current of compressed air is passed through the petroleum, forming a gaseous compound, which is kept continually ignited, the piston being operated by the products of combustion.

"The advantage possessed by this form of engine over the steam engine is that it is started in a few seconds by the ignition of a match, and is as easily stopped by cutting off the supply of air. In an engine which is used intermittently this is a great advantage, as no consumption of fuel takes place when the engine is standing, and there is no fire to maintain or water supply to watch. In engines, such as fire engines or street car motors, it is of considerable importance to be able to start the motive power at a moment's notice without any preliminary preparation in the way of getting up a boiler pressure. The safety of the engine is proved by the fact that the insurance companies make no increase on the rates of insurance of buildings in which it is in use; while in one trial an engine was enveloped in cotton and operated for a considerable time.

"The advantage of this engine over those worked by the consumption of lighting gas is that the combustible compound is made or mixed in the cylinder; hence, there is no reservoir of combustible or explosive compound without the limits of the engine; hence, any leaks that might accidentally or otherwise occur introduce no elements of danger. Furthermore, the combustion is slow and continuous, the products working expansively, precisely as in an ordinary steam engine.

"At a trial trip of one of these engines, made at the factory, 25 Potter street, Providence, R. I., and placed on a 35 feet boat, a speed of nearly 20 miles has been obtained.

"The inventor of this engine has devoted some twenty years of unremitting labor in its design and construction, amid difficulties that would have caused less persistent minds to have given up in despair, and his success at last is only another proof of what indomitable perseverance and intelligent experiment can accomplish.

"The engine has obtained favorable recognition from transatlantic engineers, and is now being applied to yachts and street cars as well as to stationary purposes."

Oil was fed to the cylinder of the Brayton engine by being introduced to an absorbent wicking placed in a circular groove at one end of the cylinder, layers of wire

netting and a perforated plate being imposed thereover, while air was passed through said wicking, under pressure, from an adjacent chamber. A small perforation through the wick support permitted a tiny stream of carburetted air to enter the cylinder and provide a continuous flame for ignition purposes.

Upon the dashboard of the "horse car" an inwardly projecting frame was built, the brake handle being supported at the right thereof, while toward the left three notches were formed to hold the operating lever respectively at the slow and fast speed, and the reverse positions. This lever connected at its lower end with a rod extending longitudinally beneath the car, where it had a connection with the clutch mechanism on the engine shaft, and by a rocking motion could vary or disengage said connection.

One of the side seats in the car was cut away centrally to receive the engine, and Mr. Brayton was very proud of the fact that so doing only displaced the room for one person. The transmission was located beneath the car body, between the forward and rear axles of the car wheels, the engine shaft being in parallelism with said axles. A chain connected this shaft with the driving axle, while a friction clutch of the cone and cup type was employed to make the various operative connections.

Import Duties on Automobiles.

The British Board of Trade Journal has compiled a list of import duties charged on motor vehicles in foreign countries and British possessions from particulars contained in the official editions of the tariffs of such countries and possessions and from other sources of information.

Russia.—Motor vehicles pay duty as carriages according to kind, the motor being dutiable separately at the rate of \$3.30 per cwt. of 112 pounds. In the case of automobiles with undetachable motors, if it is impossible to ascertain from invoices or other documents what is the actual weight of the motor, such weight will be taken as equivalent to 30 per cent. of the weight of the car with the motor attached. The rates of import duty on carriages of various kinds are:

Large, such as coaches, landaus, diligences and omnibuses, each, \$122.04.
Small, such as calashes to seat two persons, dog carts, etc., each, \$83.20.
Vans and hand carts, each, \$36.95.

In the case of carriages completely upholstered an additional 20 per cent. is levied.

Norway.—Motor cars and carriages pay duty at the rate of \$2.04 per cwt.

Germany.—Motor cars pay an import duty of 98 cents per cwt.

Belgium.—Automobiles, motor cars, etc., pay 12 per cent. ad valorem; motor cars used by travelers visiting Belgium are exempt from duty.

France.—Automobiles with detachable

motors pay the rates of duty on carts or carriages, according to their nature, the motors being dutiable separately. Automobile carts, wagons, etc., for trade, with undetachable motors, are dutiable as motors on their whole weight, while automobile cars and carriages with undetachable motors pay on their whole weight at the rate of duty fixed for carriages.

The rates of duty on motors are:

Gas, petroleum, hot air and compressed air engines weighing 551 pounds and above, per cwt., \$1.17.
Weighing less than 551 pounds, per cwt., \$1.66.

Portugal.—The rates of duty on automobiles are, at par exchange: Complete, \$131.40; incomplete, \$76.60.

Spain.—Automobiles are dutiable as the carriages they resemble, without any addition of duty for the motor. The rates of duty on carriages are:

Coaches and berlins of four seats and light carriages with two "tableros" and boxes, with or without hoods, at par exchange, \$194.66 each.

Berlins of two seats, with or without folding seats ("bigotera"), and omnibuses with more than fifteen seats, and diligences, at par exchange, \$146 each.

Four or two wheeled carriages, without "tableros," with or without hoods, and without regard to number of seats, omnibuses with not more than fifteen seats, and carriages not specified above, at par exchange, \$58.60 each.

Italy.—Automobile road carriages pay the following rates of duty:

With not more than two wheels, at par exchange, each, \$8.06.

With more than two wheels and not more than five springs, at par exchange, each, \$21.39.

With more than two wheels and more than five springs, at par exchange, each, \$64.22.

In assessing duty on automobiles the motor is considered an integral part of the vehicle unless it can be separated. If the motor is separable, it pays duty separately. In the case of automobiles with electric motors, accumulators which are separable from the vehicle pay duty separately, even though the motor is not separable from the vehicle. The rates of duty on motors and accumulators are: Accumulators, 220.4 pounds, at par exchange, per cwt., 78 cents.

Dynamo electric machines, weighing up to 2,204 pounds, at par exchange, per cwt., \$2.44.

Weighing more than 2,204 pounds, at par exchange, per cwt., \$1.56.

Gas, petroleum, rotary motors, etc., at par exchange, per cwt., \$1.17.

Austria-Hungary.—Automobiles pay the rates of duty leviable on carriages, viz.: If without leather and not upholstered, each, \$12.03.

If with leather work or upholstered, each, \$36.10.

And, in addition, the following rates of duty in respect of the motor:

If containing more than 50 per cent. of non-precious metals, per cwt., \$2.90.
If not containing more than 50 per cent. of non-precious metals: Electric motors, per cwt., \$1.21; other kinds, per cwt., \$1.81.

Switzerland.—Automobiles for the conveyance of passengers pay a duty of \$1.96 per cwt., while automobiles for the conveyance of goods pay 58 cents per cwt.

Turkey.—The general rate of duty charged on all goods imported into Turkey (with a few exceptions, e. g., precious metals) is 8 per cent. ad valorem.

Bulgaria.—No special duty being fixed for automobiles in the Bulgarian conventional tariffs, they would be covered by the general rate of 14 per cent. ad valorem.

Egypt.—Automobiles pay import duty at the general rate of 8 per cent. ad valorem; certain other dues of small amount are also payable, bringing the rate up to 8½ per cent. ad valorem.

China.—Automobiles, not being specifically mentioned in the Chinese tariff, would pay duty at the rate of 5 per cent. ad valorem.

Philippines.—Automobiles pay import duty at the rate of \$60 each.

BRITISH POSSESSIONS.

India.—Automobiles are not separately mentioned in the tariff of India, but carriages and carts of all kinds (other than railway carriages), and generally articles not specified in the tariff, pay 5 per cent. ad valorem.

Straits Settlements.—All goods (with the exception of spirits, etc.) are free of duty.

Ceylon.—Automobiles, not being specifically named in the Ceylon tariff, would be liable to duty at the rate of 5½ per cent. ad valorem.

Mauritius.—Automobiles for agricultural purposes are duty free up to June 30, 1903; other automobiles pay duty at the rate of 10.4 per cent. ad valorem.

Seychelles.—Motor cars are not mentioned in the Seychelles tariff as being subject to any special duty, nor do they appear on the free list; they would consequently pay 15 per cent. ad valorem.

Hong Kong.—Automobiles are free of import duty.

British New Guinea.—Automobiles, not being specifically named in the tariff, would pay 5 per cent. ad valorem.

Australian Commonwealth.—Motor vehicles pay 20 per cent. ad valorem.

New Zealand.—Motor cars pay 20 per cent. ad valorem.

Fiji.—Motor cars, whether classified with "carts and carriages" or with "articles not specified or not included in the free list," would pay import duty at the rate of 12½ per cent. ad valorem.

Falkland Islands.—In the absence of any special rate of duty, motor cars would be free.

South African Customs Union (Cape Colony, Natal, Orange River Colony).—Automobiles would apparently be liable to duty at the rate of 20 per cent. ad valorem "as all wheeled vehicles (not otherwise enumerated) intended for the conveyance of persons or goods."

Transvaal.—As no special duty is fixed for automobiles in the Transvaal tariff, the rate payable would be 7½ per cent. ad valorem. In addition, transit duty at the rate of 3 per cent. is payable in the South African Customs Union and Portuguese East Africa (Delagoa Bay) on automobiles imported en route to the Transvaal.

Lagos.—In the absence of any special duty, automobiles pay 10 per cent. ad valorem.

Sierra Leone.—As automobiles do not appear in the list of articles subject to special rates of duty or in the list of exemptions, the general rate of 10 per cent. ad valorem would be applicable.

Gambia.—Automobiles are not specifically named in the tariff, and would consequently pay duty at the rate of 5 per cent. ad valorem.

Canada.—Automobiles are not specifically named in the Canadian tariff, but it appears from a report of the United States Consul in Victoria, British Columbia, that the Canadian customs authorities treat them as "machines," not separately enumerated, and the rate of duty accordingly is 16.23 per cent. ad valorem, if imported from the United Kingdom and accompanied by a certificate proving them to be of British manufacture.

Bermuda.—Automobiles, not being specifically named in the tariff or in the free list, would pay 5 per cent. ad valorem.

British Honduras.—So far as not comprised under the heading of "carts for agricultural purposes, trucks for use in mahogany works, carts for use in logwood works, railway and tramway plants," all of which are exempt from duty, automobiles would pay at the rate of 10 per cent. ad valorem.

Bahamas.—Automobiles would apparently be dutiable at the rate of 20 per cent. ad valorem, not being separately enumerated in the tariff. Railway and tramway rolling stock is duty free.

Jamaica.—Automobiles are not specifically named in the tariff, and would therefore pay 16.23 per cent. ad valorem. Railway rolling stock is duty free.

Barbados.—Automobiles would apparently pay 10 per cent. ad valorem, not being specifically mentioned.

Trinidad.—Railway and tramway vehicles are free of duty; automobiles for road use would pay 5 per cent. ad valorem.

British Guiana.—Motor cars, not seating more than four each, pay an import duty of \$80; for each seat above an additional \$30 is levied. A surtax of 5 per cent. on the amount of duty payable is also levied.

Gibraltar and Malta.—No duty is levied on automobiles.

Lecture on Storage Batteries at the A. C. A.

At the meeting of the Automobile Club of America on Tuesday night, November 17, the first of two lectures on storage batteries was delivered by Lamar Lyndon, a storage battery expert. President Scarritt presided, and in opening the meeting drew attention to the present status of the club, which, he said, had 400 odd members. He said that the by-laws would soon be changed to enable the club to largely increase its membership, and thought it would be possible to attain a membership of 800 within a year. The platform on which the club would stand would be "good roads, good laws and good behavior on the part of automobilists." The latter, he thought, should use such caution in driving that the public could not help noticing their carefulness and consideration, and if that was done, within a year or two all opposition to the automobile would vanish, and the automobilist would have the same freedom as is now enjoyed by cyclists, for instance.

President Scarritt then introduced the lecturer of the evening, Mr. Lyndon, who is not only an authority on the subject of storage batteries but also a very accomplished lecturer. Mr. Lyndon began by explaining the units used in electrical measurements, the volt, ampere and ohm, and the law by which the different quantities in electrical phenomena are related. Next he explained the chemical reaction taking place in the lead storage battery, and illustrated his statements by experiments, some of which were projected on the screen.

Both of the active materials, the spongy lead and the lead peroxide, are good electrical conductors, which is essential. When a storage battery is allowed to stand in the discharged condition, lead sulphate is formed, which is an electric insulator, and has a very deleterious effect on the cell. The sulphating process accompanies the process of discharge, and while it is therefore not possible to entirely prevent sulphation, it must be restricted to certain limits. Makers now usually caution their customers not to continue the discharge below 1.7 volts, as beyond that point sulphation becomes too great. One of the effects of sulphation is that the capacity of a cell decreases as the rate of discharge increases. The cause of this phenomenon is that during discharge the plates are covered with a thin layer of lead sulphate, which prevents the electrolyte from diffusing into the plate. This effect was illustrated by a curve projected on the screen, which showed that a cell which will give two ampere hours when discharged at an eight hour rate will give only 75 ampere hours when discharged at a three hour rate, and about 50 ampere hours when discharged at a one hour rate. Another result of sulphation is the phenomenon known as "residual charge." That is, if

a cell be discharged very rapidly to the specified low voltage limit and then be allowed to stand for an hour or so, the voltage will be found to have risen and a considerable additional charge can be drawn from the cell.

Theoretically .135 ounce of active material on each plate will give a capacity of one ampere hour. In practice, however, one ampere hour is only obtained from 1.3 ounces of total active material. The capacity of modern storage batteries is 5 to 8 watt hours per pound of total weight for stationary batteries and 8 to 12 watt hours actual per pound of total weight for automobile batteries. As much as 18 watt hours per pound of weight was claimed by some manufacturers, Mr. Lyndon said.

The voltage of the cell increases slightly with the density of the electrolyte, and this relation was illustrated by a curve projected on the screen. The resistance of the electrolyte should, of course, be as small as possible. The resistance of a sulphuric acid solution decreases as the density increases up to 30 per cent.; from 30 to 40 per cent. the resistance remains practically constant, and above that density the resistance increases again. The best density to use is, therefore, from 28 to 35 per cent. The acid used in making the solution should be extremely pure (made from sulphur and not from pyrites), and, above all, not contain any iron, platinum, copper or mercury or any of their oxides, which are very detrimental.

A change of temperature also has an effect on the capacity of the cell, an increase in temperature resulting in an increase in the capacity. The best method of ascertaining the state of charge of a cell is to test its acid density, but in order that such a test may be reliable it must not be made until the cell has been at rest for at least an hour, to allow the acid to diffuse through the active material and insure uniform density of the electrolyte throughout.

The concluding lecture on this subject will be given on December 1.

Next Year's Gordon Bennett Course.

According to recent reports from Berlin it is now practically settled that next year's race for the Gordon Bennett Cup will be run over the course in the vicinity of Homburg, which is referred to as the Saalburg-Limburch course. The course has been traveled over recently by Prince Henry; the mayor of Homburg; Herr Engler, president of the Frankfurt A. C., and others, and their comment on it has generally been favorable. The German Automobile Club, of course, has the sole voice in determining where the race shall be held.

It may be stated that the proposals made by various motoring bodies include the suggestion of holding the meeting in the Duchy of Mecklenburg—where it would be practically impossible to arrange ac-

commodation for a vast concourse of visitors—as well as on a course near Bielefeld.

LENGTH OF THE COURSE.

According to the plans mapped out for the Saalburg-Limburch course, the race would start from Donaldshausen, a hamlet the well paved 48 foot main street of which has an average rise of about 10 per cent. until the crest of the Saalburg Hill is reached about 2 miles distant. Here, if this route is approved, what is described as a double tribune will be erected to accommodate 40,000 people, at a charge of 20 marks a head, which would greatly swell the fund for defraying the expenses of the race. Moreover, the renovated Roman camp would afford excellent accommodation for the several hundred automobiles in which spectators would journey from far and near to the scene of the start and finish of the race. The roads here are thoroughly well built, the beds being made with a coarse crushed quarry stone, while the tops are composed of a very fine and light variety of slate stone, the binding qualities of which are remarkable. During part of the 55 miles between Saalburg and Usingen, by way of Wehrheim, the course curves through some woods. Afterward, however, comes one of the finest series of roads for motoring in the German Empire—long, straight, undulating highways of sufficient width, that taper away in perspective far ahead. These continue through Grävenviesbach right on to Weilburg, which is entered by an avenue of ancient beeches, so planted that six cars could be driven abreast along the thoroughfare. This kind of scenery continues, and the hill climb of the course is entered on by way of Altendorf and so to Heckholzhäusen and Obertiefenbach to Limburg, about 37 miles from Usingen. About 0.4 miles before the old and picturesque cathedral town is reached, however, a sharp triangular curve in the road has to be negotiated, but it is more than likely that this curve will be done away with if the German Automobile Club decides in favor of the course. The necessary work of improvement at this spot would not be a costly undertaking, and the rest of the road until the descent through Limburg is smooth straight and through open country on both sides.

THE SECOND PART.

Limburch is midway in this course, the first half of which forms a fairly bold curve, but the second part is less regular. Thus there is a nearly straight run of 177 miles to Neuhoof, a nearly about face turn and an inward curve of 19 miles to Königstein, the route ending with an outward curve to Kastell Saalburg 12.1 miles distant, making the total length of the course 86.4 miles. After passing out of Limburg over the old bridge there is a clear run on splendid roads right through the village of Kirberg to Neuhoof, then, by way of Eschenhahn, Idstein, Esch, Glashütten, Königstein and Cronberg with its old and new castles, belonging to Prince

and Princess Frederick Karl of Hesse, there is a finely wooded way right on to Oberursel, which is passed on the right. Thence to Saalburg the route is by way of Oberstetten, Pöhlhölzhausen and Donaldshausen, though some of the roads here are not suitable for racing purposes. There may, therefore, be some alteration connected with the last few miles.

It will be noted that Frankfort-on-Main and Wiesbaden, as well as Homburg and Nauheim, lie near this course. There would thus be little difficulty in housing the many visitors who would attend the race. Moreover, as Herr Marx points out, owing to the prosperous population of the district, the roads are throughout more than usually well kept, a great deal of money being spent on maintaining them, despite the fact that many of them lead through woods and over hills. Nor are the thoroughfares in any part less than 32 feet broad, while for long distances, such as between Weilburg, Limburg and Kirberg they are 48 feet. True, there are some fairly stiff hills and a few ugly curves, which, however, are not worse than some of the unexpected windings of this year's Irish route, and most of which can be done away with. In no other part of Germany could the necessary sum required for the expenses of a race over such an extensive course be forthcoming. The Municipal Council of Homburg and the hotel-keepers have between them already voted a sum of \$5,000, while the Adler and Opel firms of Frankfort-on-Main have each subscribed \$1,250 to start with, and the Hotelkeepers' League of that city has decided that should the race be run off over the proposed course it will contribute largely to the fund for putting the course in order. It is anticipated that a total expenditure of about \$30,000 will be necessary, and it is thought in the district that there will be no difficulty in raising such a sum.

OPINIONS ON THE ROAD.

Riegel, the chauffeur who drove Prince Henry of Prussia over the proposed route in a very long framed 14 horse power Adler tonneau at an average speed of 25 miles an hour, gives it as his opinion that the road is splendid for racing, though there are a few damp parts where the trees grow too near the highway; some curves which, unless they can be got rid of, will necessitate slackening speed, though in the majority of cases they can be seen some distance ahead; and some steep hills, but none which racing machines should find the least difficulty in negotiating. Moreover, it is desirable in a long course to have a road which will in parts test the powers of a machine to do all round good work and overcome occasional difficulties as well as slow down and get up pace again in a minimum of time.

That the German Automobile Club has not yet announced its decision in the matter is to be accounted for by the fact that the German Emperor has made known his

desire that every possible precaution should be taken to ensure the selection of the best course in the empire. There is, therefore, a likelihood that the club will continue to carry on its prospecting work for some weeks to come, though expert opinions seem generally to have decided in favor of the Saalburg-Limburg course.

The entrance fee for the eliminating trials for the one open place in the German team will be \$2,500, one of the latest entrants for the competition being the Neue Automobile Company of Berlin. The tests will consist of three races uphill and as many down, in each of which times will be taken for the flying kilometre, after which there will be a similar series of trials in which times for the standing mile will be taken. The vacant place will be allotted to the car which makes the best average time performance.

Space Allotments at the Chicago Automobile Show.

The demand for space at the Chicago Automobile Show, to be held February 6 to 13, was such that it has been found necessary in making allotment of space to place practically all accessory exhibits in the gallery. These allotments will not be made public for several days. Following is a list of makers to whom allotments of space have been so far made: Winton Motor Carriage Company, Charron, Girardot & Voigt Company, Knox Automobile Company, Studebaker Brothers Manufacturing Company, St. Louis Motor Carriage Company, Cadillac Automobile Company, Geo. N. Pierce Company, Electric Vehicle Company, Locomobile Company of America, Woods Motor Vehicle Company, Thomas B. Jeffery & Co., Crest Manufacturing Company, F. B. Stearns Company, Haynes-Apperson Company, Temple & Austrian, Olds Motor Works, Packard Motor Car Company, Peerless Motor Car Company, E. R. Thomas Motor Company, Hoffman Automobile Company, Elmore Manufacturing Company, Northern Manufacturing Company, Autocar Company, Kirk Manufacturing Company, White Sewing Machine Company, National Motor Vehicle Company, Apperson Brothers Automobile Company, Ford Motor Company, Matheson Motor Car Company, Limited, Mitchell Wheel Works, Columbus Automobile Company, Fredonia Manufacturing Company, T. L. Tinscher, Regas Automobile Company, Sandusky Automobile Company, Michigan Automobile Company, Irvin Tennant, Chelsea Automobile Company, Marble-Swift Automobile Company, Holley Motor Car Company, A. C. Banker, Sintz Motor Company, Waterloo Gas Engine Company, Union Automobile Company, Premier Motor Manufacturing Company, American Darracq Automobile Company, Mead Cycle Company, Reid Manufacturing Company, J. H. Dawson Machinery Company, Federal Manufacturing Company, Chicago Motor Cycle Company, Austin Automobile Com-

pany, Rodgers & Co., Auburn Automobile Company, Model Gas Engine Company, Wheeler Manufacturing Company, B. F. Goodrich Company, Hartford Rubber Works Company, G & J Tire Company, Bartholomew Company, Diamond Rubber Company, Rothschild & Co., Fisk Rubber Company, Dusquesne Manufacturing Company, Pittsburg Reduction Company, Twentieth Century Manufacturing Company, Brandenburg Brothers & Alliger, Pope Manufacturing Company, Aurora Automatic Machinery Company, Goodyear Tire and Rubber Company, Badger Brass Manufacturing Company, Peterson & Draper, representing Brown-Lipe Gear Company, American Roller Bearing Company, Baldwin Chain and Manufacturing Company, Midgley Manufacturing Company, and the Cleveland-Canton Spring Company.

Following is a list of applicants to whom space has not been allotted: Detroit Motor Works, Cullman Wheel Company, Northwestern Storage Battery Company, American Coil Company, Rochester Steam Motor Works, Fairbanks, Morse & Co., Turner Brass Works, Electric Contract Company, Brennan Motor Company, Moisinger Device Manufacturing Company, Motor Car Supply Company, P. J. Dasey Company, Miller-Knoblock Electric Manufacturing Company, Hendee Manufacturing Company, C. F. Splittorff, American Burner Company, Manhattan Storage Company, Whalebone Rubber Company, Warner Gear Company, Western Motor Company, Briscoe Manufacturing Company, Muncie Wheel and Jobbing Company, Columbus Brass Company, Barton Boiler Company, Timken Roller Bearing Axle Company, Hussey Drop Forging and Manufacturing Company, Chas. Kaestner Manufacturing Company, Emil Grossman, Hyatt Roller Bearing Company, Shelby Tube Company, Veeder Manufacturing Company, Rose Manufacturing Company, National Carbon Company, Electric Storage Battery Company, Gray & Davis, Morgan & Wright, Flint Upholstering Company, A. H. Funke.

Developments in Automobile Construction.*

(Concluded.)

The great point in cylinder lubrication is to use the smallest possible allowance with regularity, since it is useless to send an excessive quantity of oil into the cylinders—much of which is wasted, and merely throws extra work upon the separator—and then to have a long interval, during which no oil is supplied, when injury may result to the working surfaces. There is no doubt that the question of separation of oil is entirely bound up with that of provision of a perfect form of oil feeder to the internal parts of the engine. Lubricators on the sight feed and displacement principles I have not found to be satisfactory. The only satisfactory form which I have found

is a positive pump, which forces a measured quantity at regular intervals into the cylinders, during all the time they are in operation. One difficulty experienced in pumping so small a quantity of oil positively was to safeguard against the effect of minute leakage back to the pump, but this has now been overcome in a practical manner, and the supply of oil to the cylinders made entirely automatic and removed from the care of the driver, who has merely to replenish the oil reservoir about every 1,000 miles.

PREVENTION OF LEAKAGE.

Another important detail in the fitting of steam cars is the prevention of leakage from pipe joints. Brazed joints have not been found satisfactory, and screwed joints are objectionable, as it means using a heavier weight of pipe than is necessary to resist the pressure, in order to provide the extra thickness at the ends necessary for screwing. On the other hand, copper not having proved reliable, I have adopted solid drawn steel pipes for all the service lines on the car. The thickness of this tube is about 18 gauge, and is of abundant strength to resist any possible internal pressure, but it is not thick enough to weaken by screwing at the ends. This difficulty is overcome by making a special form of union, and by flanging the ends of the pipes, the union joining the flanges together with a jointing ring between. Since adopting this form of joint not the slightest trouble has been experienced through leakage, and one of the greatest causes of stoppage and annoyance has been eliminated.

COMFORT OF TRAVEL.

Coming now to the general question of the comfort of traveling on the road by motor car, several difficulties are met with, chief of which may be noted the problem of the tires and the dust. The use of pneumatic tires unquestionably gives greater smoothness, especially on bad roads when traveling at high speeds, but there is always present the liability of puncture. For moderate speeds, up to 25 miles per hour, I have found properly constructed solid tires, combined with a good spring suspension, to give practically the same freedom from vibration, and giving substantial comfort in the knowledge that one is not liable to be stranded on the road at any moment by puncture. The construction of solid tires has latterly been much improved, by making them endless, and by attaching them to the rim of the wheel by bolting between a couple of steel flanges instead of the ordinary form of channel fixed on the rim. I repeat that, with speeds up to 25 miles per hour, riding upon these tires is as comfortable as upon pneumatics. Further, although it is not fashionable in automobile circles at present to speak against speeds in excess of 25 miles an hour, I think the sooner the high speed craze comes to an end the better for automobilism.

THE QUESTION OF SPEED.

I submit that a speed of 25 miles per hour need never be exceeded for any commercial purposes, and, with the exception

* Paper read by T. Clarkson before Section G of the British Association.

of a small sporting section of automobilists—the importance of which will gradually diminish—this speed will generally be considered as ample and sufficient for all purposes of pleasure also. I do not by any means pretend to say that a speed of 25 miles per hour is always permissible, as everyone must recognize the impossibility of fixing any limit which will be safe and reasonable under all conditions, but I beg to lodge a protest against the outcry that the automobile industry is doomed merely because the indulgence of the very high speeds is discouraged. The sooner the speed question settles down within common-sense limits the better for everybody.

Next as to

THE DUST PROBLEM.

This is partly connected with the speed question, as the dust is not such a serious difficulty to other users of the road when cars are traveling at moderate speeds. The dust problem is divided into two parts. First, as affecting other users of the road, and, secondly, the occupants of the car. A moderate speed, combined with improvements in the preparation and treatment of the surface of the road, may go a long way toward settling the question altogether, but as it will be a long time before the general road surface of the country is materially altered, I submit that the solution of the dust problem for the occupants of the car is to adopt a covered form of car rather than the open and exposed type, and there is already a decided tendency noticeable in this direction.

In the early days of railway locomotion the passengers were carried in open trucks, where they had the full benefit of the breezes, but had no protection from the sun, rain, or dust. It was soon found necessary to cover them in, and no one now asks for an uncovered railway carriage. The same thing is likely to be repeated in the design of automobile bodies for the convenience of passengers. Observation of the condition of a car at the end of a journey will show that practically the whole of the dust is on the rear of the car, the front parts being fairly clean. The explanation of this is that the front of the car is for the most part traveling in a clear atmosphere, but the dust raised by the wheels is sucked after the car in a partial vacuum produced by its movement through the air, and if the rear portion of the car is effectively enclosed and made dust tight the front and sides may be left fairly clear.

CLOSED BODIES.

Among the other advantages of covering in the body I may enumerate protection from rain, sun, wind and flies; comfortable traveling in all conditions of weather, without the necessity for using a special and more or less disfiguring costume; suitability for either day or night service, also for warming the interior of the car in cold weather, which may be done inexpensively by the use of a little of the waste heat of the engine; and in this connection I desire to indicate a new source of pleasure and en-

joyment to be derived from touring through the country in the winter time, even with several inches of snow, when passengers may enjoy the scenery while remaining as comfortable and as snug as at home.

Another advantage possessed by the covered car is that it provides a safe storage for the property of the owner, and one's wraps and personal effects may be locked up in the car while the owner is away; also there is ample space available on the roof for luggage, without incommencing the passengers.

UPWARD EXHAUST.

Still another advantage of the covered car is that it permits the employment of very effective, yet unobtrusive, means of obtaining a good natural draught for the removal of the products of combustion. This is a special advantage to a steam car, for although the products of combustion may be got rid of laterally, or underneath the car, there is no doubt the best result is obtained by permitting the gases to ascend in the direction they are naturally disposed to take. I think it would be an advantage for all cars, whether steam or gasoline, to discharge the products vertically upward, instead of as at present. In this way any objectionable fumes would be dissipated more quickly, and without leaving an objectionable trail on the road, which is offensive to the public.

Finally, I beg to urge upon all interested in this great development of engineering, which is sure to have so large an effect on the general welfare of the community, to discourage the indulgence of high speeds—which are unnecessary and prejudicial—and to encourage manufacturers to specialize in the production of one standard useful size of motor, which may be applied to many different purposes. Only in this way can manufacturers hope to combine the highest excellence of construction with the low cost of production which will enable this country to challenge the competition of the world.

Automobiles and Motor Cycles in Manœuvres.

It is reported that the use of automobiles and motor bicycles in the manœuvres held this fall in Southern Hungary proved entirely satisfactory. Several of these vehicles were in use by the staff of each army corps. No great speeds could be made, as the communications were poor and the territory was occupied too much with soldiers; but at the speed of 6 miles per hour certain roads were passed which none of the artillery vehicles could get through without an extra team. An automobile of native construction transported a staff officer and five other occupants from Batta via Zabolez to Dorgos over a road which was almost impassable to artillery vehicles drawn by six horses. The average speed attained with the automobile was 24 miles per hour, and that attained with the motor cycle 14 miles.

MINOR MENTION



The Columbus Motor Vehicle Company, Columbus, Ohio, have made several export shipments.

It is rumored that Harber Brothers, Bloomington, Ill., will erect an automobile factory next spring.

The Kensington Automobile Company, Buffalo, N. Y., has made a general assignment to Albert Schelling.

J. C. Turner, Birmingham, Ala., is suing the Alabama Southern Railway for \$3,000 damages for the destruction of his automobile at Powderly, Ga., on July 26 last.

The Automobile Club, of Ft. Wayne, have passed a resolution demanding that if the new auto speed law, introduced by a saloonkeeper, is to be enforced the mayor must also enforce the saloon closing law.

The Alden Sampson Manufacturing Company, Pittsfield, Mass., expect to build twenty-five or more 35 horse power touring cars next year. They will be represented at the Show.

Press dispatches from Marinette, Wis., report that the Wisconsin-Michigan Railway has decided to use automobiles pending the extension of its line from Quinnesec to Iron Mountain.

A consulate of the American Motor League has been formed at Pittsburg, Pa., with E. E. Keller, senior consl: G. Harton Singer, junior consl, and John A. Hawkins, secretary-treasurer.

It is reported that the Pope Manufacturing Company have given orders to start up their Hagerstown (Md.) plant for the manufacture during the year 1904 of 1,000 6 horse power gasoline runabouts.

The Matheson Motor Car Company are building three machines at the shop of Charles R. Greuter, Holyoke, Mass., one for the New York Show. They are still undecided where to locate permanently.

A rumor circulated last week to the effect that T. B. Jeffery & Co., Kenosha, Wis., had been sued by the Association of Licensed Automobile Manufacturers is denied by the former company, who state that no papers have been served on them.

Sidney B. Bowman and W. T. Jones, of the Bowman Automobile Company, New York, will sail for Paris November 28 to attend the Automobile Show and make arrangements for the importation of Cleincent gasoline cars, the exclusive agency of which they state they have secured for the United States.

The Electric Vehicle Equipment Company will discontinue their garage at 210 to 214 North Broad street, Philadelphia, and devote their entire attention to the manufacture of commercial vehicles at their factory, Twentieth street and Montgomery avenue. They have sublet the Broad street premises to E. H. Godshalk, who will con-

tinue the garage business under the name of the Keystone Motor Car Company.

Charles Bemendorfer is reported endeavoring to establish an automobile factory at Goshen, Ind.

Joseph J. Mandery, Rochester, N. Y., has purchased the property at 150 to 160 South avenue, and will erect thereon an up to date garage.

Prince Henry of Prussia, who has been using a Locomobile steam survey during the past year, has just ordered a 1904 model Locomobile steam survey.

A report from Dover, Del., states that among the sportsmen who opened the gunning season there recently some went rabbit hunting in an automobile.

We are informed that the Graham-Fox Motor Company and the Eisenhuth Horseless Vehicle Company, of Middletown, Conn., have been consolidated.

H. Levich, of the Central garage; F. T. Birdsall, of the Deaeville agency, and Alexander Fischer will sail for Europe soon to attend the Paris Exposition.

Messrs. Cook, La Roche, Auger and Nehl, of the American Darracq Automobile Company, will sail for Paris on the Kronprinz December 1 to arrange for next year's business with Darracq et Cie. They expect to be gone about three weeks.

The Wilson & Hayes Manufacturing Company have purchased the Michigan Tin Can Company property at 773 to 777 Bellevue avenue, Detroit, Mich., consisting of a nearly new large two story brick factory on the Michigan Central Belt Line, and are moving there the machinery from their Cleveland factory.

The Buffalo Specialty Manufacturing Company, Buffalo, N. Y., have secured a judgment and injunction against the Linole Manufacturing Company and Henry N. Yapp & Co., Detroit, agents of the Linole Company, for infringement of the Duryea patent No. 578,551 on a fluid compound for healing punctures in pneumatic tires.

Mason G. Worth, the member of the Philadelphia Automobile Club on whom a fine of \$5 and costs was recently imposed on a charge of running his automobile beyond the legal speed limit in Fairmount Park, has given notice of an appeal and threatened to swear out a warrant for the arrest of the park guard who made the complaint.

The trustee in bankruptcy of the Shelby Motor Car Company, Shelby, Ohio, has applied to the court for permission to sell all the assets at 1 o'clock p. m. on Wednesday, December 9. A summary of the appraisement is as follows: Raw material in stockroom, \$2,079.53; raw material in third story, \$476.60; raw material in trimming shop, \$1,091.72; raw material in paint shop, \$211.60; raw material in oil house and sundries, \$170.52; total, \$4,059.57. Office fixtures, \$314.50; machinery, \$6,500; tools and appliances, \$700; pulleys and belting, \$145.22; odds and ends and partially completed product, \$1,815; finished and nearly

finished cars, \$6,008; total appraisement, \$19,811.29.

It is reported that Homan & Schulz will handle the Rambler automobiles in New York the coming year.

The Knox Automobile Company has placed its Pittsburg agency in the hands of Louis E. Reinegan, Frick Building.

It is reported that "Plunger" Ryan, who has recently come into notoriety in New York, will start a large garage at Cincinnati, Ohio.

Cole & Woop are building a new King of Belgium body, which they expect to take to the Paris Exposition if finished in time. It is of novel shape and seats six persons and with the auxiliary seat seven.

On Saturday, November 21, L. J. Phelps, of the Phelps Motor Company, Stoneham, Mass., broke the record for gasoline cars on Commonwealth Hill, Boston, beating the time of E. C. Eldridge by about five seconds.

H. D. Ryus in a White touring car stripped for racing won the Huntington \$1,000 perpetual challenge cup at the Southern California races at Los Angeles last week. Frank A. Garbutt, the well known Pacific Coast amateur, also driving a White, was second in this race.

The Harvard Automobile Club, Cambridge, Mass., is following the example of the Boston Y. M. C. A., and is advertising a course of lectures on the automobile for automobile owners, prospective buyers and mechanics. William E. Furniss is manager, and the course opens December 15.

A company has been incorporated to open a garage on St. Catherine street, Montreal, Canada. The officers are: U. H. Dandurand, president; C. F. Stanley, vice president; T. A. Reeb and R. N. Ahern, directors; and L. D. Robertson, late manager of the Canada Cycle and Motor Company's Quebec branch, managing director.

The Peerless Motor Car Company are anticipating the erection of a large garage in Boston. The location has not as yet been decided upon, but as the company's quarters are entirely inadequate to properly take care of the large number of cars already sold it is practically assured that a new station will be ready for occupancy in time to handle the spring business.

At a recent meeting of the Springfield Automobile Club these officers were elected: President, Dr. H. C. McDeratt; first vice president, Dr. W. R. Weiser; second vice president, Harry A. Fisk; third vice president, C. Johnson; fourth vice president, Dr. J. W. Hannum; secretary, B. J. Griffin; treasurer, C. R. Bunker; directors, Mark Aitken, W. M. Stacey, W. F. Anderson and F. A. Carr.

The business of Grout Brothers, Orange, Mass., has been reorganized and incorporated under the laws of Massachusetts as the Grout Brothers Automobile Company, with the following officers: President, C. B. Grout; vice president and manager, F. E. Grout; treasurer, F. L. Grout,

and secretary K. A. Grout. A new model steamer, at \$650, a two cylinder 16 horse power gasoline machine, and a 5 ton steam truck are in process of manufacture.

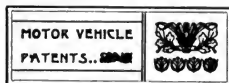
C. A. Duerr & Co., agents for the Ford cars, will move from Thirty-eighth street to 1787 Broadway, corner Fifty-eighth street, where they will establish a sales agency only, retaining a garage and repair shop at 50 West Forty-third street.

Eric, Pa., automobilists who refused to register their automobiles and pay the special tax required under the new law and who were sued by the authorities, must stand trial, the judge having refused to quash the indictments in the claim that the law was unconstitutional.

A series of short talks on 1904 touring cars was started in the club rooms of the Long Island Automobile Club on November 18. P. H. Deming talked on the White "steamer." These talks will be continued on Wednesday evenings throughout the winter. On December 2 the subjects will be the "Toledo" and the "Rambler"; on December 16, the "Franklin"; on December 23, the "Knox"; on January 6, the "Ford"; on January 13, the "Thomas," and on January 27 the "Haynes-Apperson." The annual meeting and dinner of the club will take place December 9. W. E. Scarritt, Harlan W. Whipple, Frank Roche and P. Owen will take part in a "smoke talk" on December 23.

President W. E. Scarritt, of the A. C. A., has appointed the chairmen of the various committees as follows: Racing, O. W. Bright; laws, J. B. Dill; library, A. R. Shattuck; house, Homer W. Hedges; city roads, Jefferson Seligman; maps, Cortland F. Bishop; good roads, A. R. Shattuck; membership, H. Rogers Wintrop; foreign relations, Clarence Gray Dinsmore; exhibitions, Gen. George Moore Smith; technical, Dr. S. S. Wheeler; contest, John A. Hill. The following new active members have been elected: Grant B. Schley, W. T. Chaloner, B. Schley, T. A. Haeney, W. C. Shanley, B. M. Shanley, Jr.; James H. Hyde, Archibald Rogers, Austin Gray, Philip T. Dodge, Jerome Siegel, Isaac Guggenheim, Frank W. Richards, Eugene S. Benjamin and John D. Thompson. H. D. Cory, of Newton, Mass., has been elected a non-resident member.

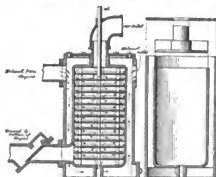
The Automobile Club of France has inserted the following paragraph in its racing rules: At its meeting of October 13 the sport committee decided that each manufacturer or dealer in automobiles, pneumatics, etc., who after a race, record or contest of any sort, may publish untrue advertisements containing claims notoriously false and intended to mislead the public, shall be liable to the penalties provided by paragraphs 58, 59, 60, 61 and 62—that is, disqualification, fine, official and public discipline, and disqualification from participation in future events.



United States Patents.

743.416. Carburetor for Explosive Engines.—Joseph D. Anderson, of St. Mary's, Ohio. November 10, 1903. Filed July 13, 1903.

This carburetor is designed for heavy crude oils. A special feature of the in-



No. 743.416.

vention is to provide for readily removing the carbureting devices from the carbureting chamber for the purpose of cleaning, this facility of removal and cleaning being specially advantageous when using crude oil, as in oil of this sort there is present considerable impure matter, which forms a residuum on the carbureting plates.

744.099. Vehicle Tire.—Charles A. Pettie, Brooklyn, N. Y. November 17, 1903. Filed October 1, 1901.

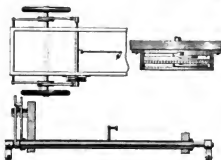
744.100. Vehicle Tire.—Charles A. Pettie, Brooklyn, N. Y. November 17, 1903. Filed January 2, 1903.

744.210. Tire for Vehicle Wheels.—George Lagache, Akron, Ohio. November 17, 1903. Filed July 13, 1903.

743.908. Vehicle Brake Mechanism.—Ogden Minton, of New York, N. Y. November 10, 1903. Filed April 27, 1903.

The brake mechanism is interconnected with the power control mechanism. The arrangement seems to have been designed specially with reference to steam cars. The first claim of the patent reads:

In a motor vehicle, a brake mechanism, an operating lever therefor, a valve controlling lever, a segment plate having a slot through which said valve controlling

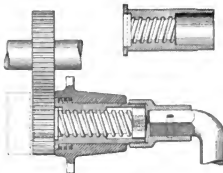


No. 743.908.

lever passes, the said slot having a notch in one of its walls into which the said controlling lever may swing, and a finger carried by the brake operating lever for engaging with the valve controlling lever.

743.637. Starting Device for Gas Engines.—David F. Grafton and Frank A. Fox, of Stamford, Conn. November 10, 1903. Filed March 11, 1903.

The invention comprises an internally threaded sleeve loosely supported in a bearing of the frame or casing of the machine in parallel relation with a gear wheel on the motor shaft, a threaded stem with in said sleeve having a gear pinion at its inner end adapted to mesh with the gear on the motor shaft, a crank socket secured to the sleeve, and suitable connections whereby a revolving movement of the sleeve serves to bring the two gears into mesh and revolve the engine shaft. The forward motion of the engine shaft operates to throw the two gear wheels out of mesh, and thus release the starting crank. The position of the pinion on the threaded shank when the engine is not being started is indicated in the drawing by dotted lines. The sleeve is surrounded by a coiled spring, intended to prevent

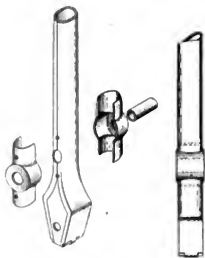


No. 743.637.

binding when the gears are forced in mesh sidewise.

743.539. Metallic Spoke for Vehicle Wheels.—Thomas Midgley, of Columbus, Ohio. November 10, 1903. Filed March 23, 1903.

This patent relates to means for securing a sprocket or brake wheel to the Midgley tubular steel wheel. The steel spoke is provided with a transverse circular opening near its head. To form a support for the sprocket wheel opposite or right and left metallic clips or reinforcers having enlarged circular seats and necks are provided, which are assembled on the spoke with their openings in line with the transverse opening in the spoke and secured thereto with pins or wire (not shown) while the spoke is dipped into a bath of molten brazing metal and all the parts are metallurgically joined together. Before this brazing operation is proceeded with a tubular reinforce is inserted in the openings in the spoke and in the clips to receive a bolt for securing the sprocket wheel. After the clips have been joined to the latter the spoke is subjected to emery wheels and the surfaces are ground



No. 743.539.

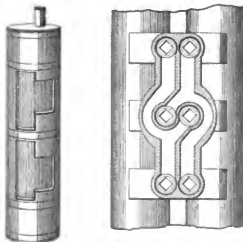
off and polished, so that the clips have the appearance of having been formed integral with the spoke.

The clips are formed in suitable dies, and after having been attached to the spokes the seats or bearings project beyond the edges of the spoke, to prevent the sprocket wheel or brake-band from engaging the spoke beyond the seat.

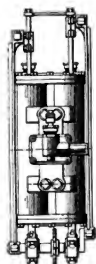
743.845. Regular Valve Mechanism for Explosive Engines.—John Ellis, of Allegheny, Pa. November 10, 1903. Filed September 23, 1902.

743.478. Engine.—William T. Fox, of Rochester, N. Y. November 10, 1903. Filed June 13, 1901.

This invention relates to a steam engine embodying two cylinders having pistons therein connected for relative movement and containing parts adapted to register with passages or ports in the cylinders, whereby the steam operating alternately upon the opposite ends of one piston is controlled by another piston, said parts being so arranged that the inlet and exhaust of the steam is accomplished to move the pistons during a portion of the stroke under expansion of the steam and to cushion the pistons in their cylinders at the ends of the stroke, thereby preventing the engine from pounding and making



No. 743.478.



No. 743-478.

a device that operates smoothly and noiselessly. The connecting rods are located at the sides of the vertical cylinders, the crossheads being above the cylinders and the crank shaft below. By arranging these parts as described long connecting rods may be employed which give a comparatively direct motion between the crossheads and the cranks at all portions of the stroke, thereby causing the middle points of the piston to more approximately register with the similar points of their cylinders when the cranks are on the quarter stroke; and this object was accomplished without increasing the length of the engine. Furthermore, in this construction the parts which are liable to require more frequent adjustment, such as the glands or stuffing boxes, are located in a more convenient and accessible position for the operator.

The operation of each piston is controlled by the movement of the other, each piston alternately governing the passage of live and exhaust steam to and from each end of the other cylinder, thereby constituting in themselves perfectly timed slide valves, which co-operate with ports suitably arranged to produce this result. The pistons are constructed in a tubular form to reduce their weight, and are closed at their ends. The slide valves are formed by cut out portions warped or curved about the periphery of each piston, forming recesses therein. These apertures or cut out portions are extended longitudinally of the pistons at each side. The various ports lead at their ends to the interior of the cylinders and are connected to the opposite cylinders or passages leading directly to the steam supply or exhaust.

744.342. Explosive Engine.—Bernhard G. Holz, Buffalo, N. Y. November 17, 1903. Filed January 29, 1903.

744.380. Hydrocarbon Engine.—Joseph C. Meredith, Kansas City, Mo. November 17, 1903. Filed January 7, 1904.

744.435. Pneumatic Tire.—Irvin Tennant, Springfield, Ohio. November 17, 1903. Filed April 17, 1904.

744.436. Pneumatic Tire.—Irvin Tennant, Springfield, Ohio. November 17, 1903. Filed August 19, 1903.

744.438. Governor for Gas Engines.—John S. Thurman, St. Louis, Mo. November 17, 1903. Filed February 9, 1903.

744.493. Vehicle Tire.—Ralph M. Connable, Baltimore, Md. November 17, 1903. Filed July 17, 1903.

744.663. Tire Construction.—Charles E. W. Woodward, Chicopee Falls, Mass. November 17, 1903. Filed September 23, 1901.

743.755. Motor Cycle.—Hibbert B. Ruggles, Brooklyn, N. Y. November 10, 1903. Filed September 16, 1902.

743.780. Mixer for Gas Engines.—Hennig F. Wallmann, Chicago, Ill. November 10, 1903. Filed March 10, 1900.

743.645. Piston.—Orlando Kelsey, Blackwood, N. J. November 10, 1903. Filed March 3, 1903.

744.011. Motor Vehicle Construction.—Anson G. Ronan, Toronto, Canada. November 10, 1903. Filed December 26, 1902.

12,170. Storm Apron.—John C. Crimins, Indianapolis, Ind. November 17, 1903. Filed July 3, 1903. Original No. 715,027, dated December 2, 1902.

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THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to
Motor
Interests

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The Eagle Rock Hill Climbing Contest.

The great interest which was shown in the Eagle Rock Hill Climbing Contest this year seems to prove that tests of this kind are still in favor with the general public and can be made a success if properly managed. One question that naturally arises is whether or not the popular success of such events is dependent upon turning them into sporting affairs, as contrasted with practical tests. There is little doubt that many of those who witnessed the contest went more particularly to see the exploits of a certain entrant far famed as an automobilist and general sportsman, and perhaps the number of those who attended for practical reasons was comparatively small. But of the many thousands who will read with interest the result of the trials, the great majority, we feel sure, will be interested more particularly in the practical results of the tests, particularly those achieved with the small cars, in which hill climbing power is an important factor.

The great improvement in organization and management, as compared with last year's contest, was noted with satisfaction, and it is hoped that if there are any more contests on this hill, as there undoubtedly will be, the same progressive spirit will be shown. If it should be found necessary, in order to secure a fairly satisfactory attendance, to make some concessions to the sporting element, it is, on the other hand, highly desirable that the practical character of the tests be preserved as much as possible, in certain of the events at least.

From a practical standpoint the tests this year were deficient in two respects. The weight of the competing cars given in the program and from there transcribed to the different reports was apparently the catalogue weight, and in many cases, where the machines were stripped, was far from the actual weight. The proper way of determining the weight would be to have the

cars officially weighed on the morning of the contest.

Another objectionable feature was that the machines were allowed to be stripped in practically all events. Some entrants availed themselves of this privilege, while others did not. No record was made of whether a car was stripped or in touring condition, and the reader of the results will not know exactly what the performance amounts to, as the difference in hill climbing ability when a car is stripped and when it carries its body is considerable. It is true that in one of the eight events the cars were required to be in touring condition and to carry a full complement of passengers, but it would seem that a greater part of the event might well be devoted to practical ends.

Classification by Cylinder Volume.

The most important subject of discussion in automobile circles in France for some time has been the revision of the system of classification in races, making cylinder volume instead of car weight the basis of classification. The Manufacturers' Association has approved of the new method of classification, and the system has been tried in a number of recent short distance races and hill tests, but the results have not been wholly satisfactory. An immediate result of the adoption of this system has been that many of the competing firms have made every effort to increase the speed of their motors. The high engine speeds thus attained are, however, a bar to high mechanical efficiency, and the proportionately short piston strokes necessary to secure high rotational speed prevent high thermal efficiency. Thus it would seem that this method of classification might well result in a retrograde movement in engine design. Some of the French manufacturers have of late become converts to the long stroke, slow speed engine, as generally favored in America, and a good deal of opposition to

the new method of classification has arisen. Thus, the technical committee of the Automobile Club of France has advised against the adoption of the system, on the ground that it would menace the rational development of motor design.

The argument of the champions of the new system has been that it would lead particularly to improvements in the transmission gear, where improvement is most needed, since, if all the cars in a class had approximately the same cylinder capacity and consequently about the same power, it would only be possible to excel by reason of greater transmission efficiency.

This latter argument does not seem unreasonable, but the industry would hardly profit from an innovation which, while promising some improvement in transmission, would menace the rational design of motors.

The Business Runabout.

Although large numbers of cars are now used for business purposes, particularly by physicians, there seems to be as yet no car on the market specially designed as a substitute for the single horse runabout in use by physicians, contractors, real estate men, etc. The demand for pleasure vehicles has until now exceeded the demand for business runabouts, and so it was only natural that designers should keep pre-eminently in view the demands of the customer requiring a pleasure vehicle. Of course, the modern high grade pleasure runabout answers quite well in the physician's service, but it cannot be denied that in pleasure runabouts a little too much is sacrificed to speed. Accessibility, durability, baggage room and comfort are all sacrificed to make the car as light, and consequently as speedy as possible. Speed naturally counts for a good deal in a pleasure vehicle, as upon it the pleasure factor is at present largely dependent. It is hurtful to the pride of the average person not to be able to keep up with others in a brush on the boulevard, and hence speed is a prime consideration with most purchasers.

While a speedy car also possesses advantages for business uses, the qualities which are usually sacrificed to obtain speed are here more important. If a car is to be used as nearly as possible every day in the year it must first of all be thoroughly reliable. This requires that the working stresses be low, which excludes high speeds. The importance of reliability also points to the use of non-puncturable tires. It is exceedingly

annoying to be delayed by tire troubles when on the way to attend an important business engagement, and in services where such delays as would be necessary to repair tire punctures are inadmissible the use of non-puncturable tires becomes imperative. It is said that a certain well known Wall Street broker, who owns an imported car and lives on a country estate on Long Island, makes it a rule to drive on in case he has a tire puncture when on his way to the city. This example will hardly be followed by many automobilists, as it is somewhat expensive.

The use of non-puncturable tires also makes low speeds imperative.

We have heard from a number of users who stated that they would be satisfied with a maximum speed of 15 to 16 miles per hour, and an average of 10 to 12 on average roads. For such speeds cushion tires or even solid tires would be thoroughly practical, if combined with good, flexible springs and large diameter wheels. With the lower gear the machines would have greater hill climbing power, and the mechanical parts would be subject to less wear.

It is a question whether the class who want such cars is large enough at present to merit much consideration by large manufacturing concerns. But it will certainly be much larger in a few years.

Muffler Efficiency Dependent Upon Heat Radiation.

It does not seem to be fully appreciated that to secure a noiseless discharge of the products of combustion in an explosion motor it is necessary only to deprive these products of their heat. Heat is the cause of the pressure of the gases, and the sudden variations in pressure cause the puffing noise which it is the object of the muffler to reduce to a minimum. The noise may be reduced essentially in two ways—by placing obstructions in the passage of the exhaust gases, thus causing their gradual expansion, and by depriving the exhaust gases of their heat. In most mufflers the gases are forced through tortuous passages and small perforations, which greatly obstructs their free discharge, and while this secures the desired result of dampening the noise in a fair degree, it also causes considerable back pressure on the engine piston, thereby reducing the engine power. On the other hand, cooling the exhaust gases reduces their tension and the noise of discharge without increasing the back pressure; in fact, the cooling may reduce the

back pressure in the cylinder. Of course, the expansion itself results in reducing the temperature of the gases, as the energy necessary for the expansion is abstracted from the heat of the gases; but the cooling effect referred to here is due to radiation.

The muffler should therefore be placed where it is subjected to a cooling draught, and should not be covered with asbestos, as it frequently is. If the muffler is so located that the driver is likely to burn his fingers on it when tinkering around the car, a screen may be placed over it at some distance from it, which will not materially reduce the air circulation around the muffler and the heat radiation from it. The exhaust gases contain a considerable proportion of water vapor, and if the cooling facilities of the muffler are sufficient to partially condense this water vapor, the noise will be much reduced.

Noise in City Streets.

The newspapers of the country have recently been devoting much attention to the constantly increasing noise in the large cities and its harmful effects on the nerves of residents. Cases have been cited where persons living in exceptionally noisy districts have actually become insane from the effect on their nerves. Traffic in the streets of the large cities has been growing denser and heavier from year to year, and the supplementing of surface railways by elevated railways has also added immensely to the noise in certain districts. But with present tendencies in municipal development there is some promise that a climax will soon be reached in the intensification of street noises. Underground construction for city railways is now being adopted in most of the large cities and a constantly growing proportion of the street traffic is by mechanical motors on rubber tires, which are much freer from noise than steel tired vehicles drawn by horses. The future city in which automobile traffic predominates will be superior to the present, both in point of cleanliness and noiselessness.

There is some likelihood that Holland will challenge for the Gordon Bennett race with a Spyker car, in which case, provided America decides to be represented, as is more than probable, twenty-four automobiles might be run, though it is improbable that Holland will send three cars. The Spyker car, which is intended to represent the Dutch Automobile Club, is of novel design, and has a six cylinder engine of 60 horse power.

The Eagle Rock Hill Climbing Contest.

The third annual hill climbing contest on the Eagle Rock Hill, West Orange, N. J., under the auspices of the Automobile Club of New Jersey, was held on Thursday last, Thanksgiving Day, and proved a great improvement over its two predecessors. Considerable effort had been expended in securing entries for the event and in arousing public interest in it, and these efforts had been quite successful. The fine, clear (though cold) autumn weather added to make the event a success. The course, which is nearly a mile long, was lined for nearly its whole length with spectators, who numbered probably between 2,000 and 3,000. Many private cars were lined up at the side of the road along the steepest part of the hill and at the cross roads.

No less than thirty-six entries had been received; all three motive powers were represented and the entries in the gasoline class ranged from the smallest and lightest to the most powerful racing cars. The steam and electric cars each had a class for themselves, and the gasoline cars were divided into sub-classes according to price, there being one event for vehicles under \$1,000 list price, one for vehicles from \$1,000 to \$1,800, one for vehicles from \$1,800 to \$3,000, and one for vehicles over \$2,000. Then there was an event open for gasoline vehicles of all prices to be run under touring conditions—that is, with a full complement of passengers—and a special event for gasoline vehicles under 1,800 pounds. About one-half of the vehicles which started ran in two events and one even in three. Each vehicle entered in more than one event was required to make a separate ascent for each event it was entered in. Of the thirty-six entries twenty-six started, including twenty-one gasoline vehicles, three electrics, one steam and one motor bicycle.

The cars passed the starting line with a



SCENE AT THE START.

flying start, and as the start was located near the foot of the hill and the approach to it was down another hill, most of the starters passed the line at their maximum possible speed. There were no restrictions on stripping except in the open for gasoline vehicles, and in some cases this process had been carried to the extreme. In No. 18, Rambler, the entire body had been removed, and a board supported on the motor starting shaft in front and a tank radiator in the rear served as a seat for the driver. The board was secured by iron wires and had a pneumatic cushion on it for the driver to sit upon.

The timing was done with the Mors electric timing outfit and the arrangements for timing the race were much more satisfactory than last year. At the starting point

the timing board was placed on a large box and at the finish the board was supported on a specially constructed framing. There were also three officials present at the finish and a considerable number at the start, so there was little chance for errors in timing.

The road surface was in fine condition, except, perhaps, that the steepest stretch was sprinkled with crushed stones, and this accounted in part for the rather phenomenal records made by some of the machines. As will be seen from the profile and plan of the hill shown herewith, the total distance from the foot to the crest of the hill is 4,962 feet and the total rise 385.33 feet. However, the start was not given at the bottom of the hill, but about 100 feet farther on, at the point indicated by the flag



THOMAS A. EDISON WATCHING THE CONTEST.



THE NEW STEVENS-DURYEA RACER.



WILLIAM K. VANDERBILT IN HIS THIRTY HORSE POWER MORS CAR.

(at the right of the plan). The actual distance and rise, as near as could be determined, were therefore 4,862 feet and 384 feet respectively, which corresponds to an average grade of 7.9 per cent. The steepest part of the grade is 12.13 per cent. It will be noticed from the plan that near the finish there is a very sharp turn in the road and that the turn just before this one is also nearly equal to a right angle. The rest of the course is almost straight.

Only one car was allowed on the course at a time, and upon arrival the finishing cars were ranged along the side of the road just beyond the finishing point, so another car could be started as soon as one had finished and the course was free. At the end of each event the cars which had

arrived were allowed to return to the starting point. This latter rule was not strictly adhered to, however.

The first car was started at 10 minutes after 10 o'clock and the contest continued uninterruptedly until 2:30. The first event to be run off was that for electric vehicles and was won by a Columbia car entered by the New York Edison Company, which succeeded in making the ascent in 6:38½. A National electric runabout, driven by an eleven year old boy, the son of Harlan W. Whipple, secured second place, and a Studebaker machine was third in point of time. The times of all those that finished are given in the table herewith.

The next event was that for the light gasoline cars, in which there were no less

than eight starters—four Cadillacs, two Oldsmobiles, one Rambler and one Orient buckboard. A Cadillac entered by the Crescent Automobile Company, of Jersey City, won this event, and the buckboard secured second place. While this event was going on, William K. Vanderbilt made a dash up the hill in his 30 horse power Mors car, which held the world's kilometre record for a while about a year back. Previous to this all the arrivals had been of the runabout class, which passed the line at a steady gait, somewhat less than 20 miles an hour, and when the "Blue Streak" tore past at over 50 miles an hour there was a scramble for safety, and later on a discussion between various parties at the finish as to by how many inches they had been cleared.

In event No. 2, for gasoline vehicles from \$1,000 to \$1,800, a special Stevens-Duryea racing car, built by the J. Stevens Arms and Tool Company, made its first appearance, and made the somewhat phenomenal time of 1:38½, thus coming very close to the Vanderbilt record. This car has an all wood frame, which is supported on full elliptic springs both in front and rear. The front axle is tubular and the rear axle a live axle. The wheels are of the steel suspension type. The car is fitted with two double opposed cylinder Stevens-Duryea motors of 7 horse power each, placed on opposite sides of the frame, the two crank shafts being coupled together. The car has no change gear. On the engine shaft between the two engines is located a sprocket pinion secured to a friction clutch drum, the friction clutch being operated by a lever capable of motion in a transverse plane. The friction clutch is not more than 8 or 10 inches in diameter, which is certainly very small when the power which it has to transmit is considered. The transmission is by chain direct to the rear axle. The car is steered by a hand wheel, the vertical shaft of which is connected by a bicycle chain to a short shaft on the front axle, which is connected by a bell crank and links to the steering knuckles. There is a large reduction of motion in the mechanism, but the steering gear is not irreversible. The driver's seat is at the middle of the frame and is very low.

The greatest interest centred in the class for gasoline vehicles over \$3,000, the entries in this class comprising a 20 horse power Mercedes belonging to Harlan W. Whipple, W. K. Vanderbilt's 30 horse power Mors, F. A. La Roche's 40 horse power Darracq, and a 24 horse power Columbia gasoline touring car entered by N. F. Brady. Mr. Vanderbilt was an easy winner, in 1:36½; F. A. La Roche took second place, making a time of 1:46. During the last event of the day an accident occurred, which fortunately did not result in any serious consequences. While F. A. La Roche made the ascent with his 40 horse power Darracq car he got too far to the off side of the road in making the nearly right angled turn, where the steepest part of the hill begins, and



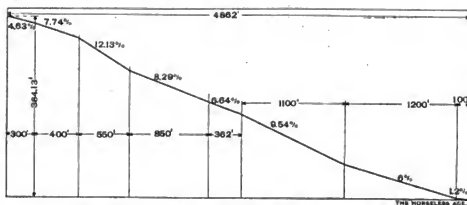
A FRANKLIN TURNING THE SHARP CURVE NEAR THE FINISH

went into the ditch. W. J. Packard, who sat beside Mr. La Roche, was thrown out of the car, while Mr. La Roche remained in his seat. Almost the only damage to the car was that the connecting rod in front of the axle was bent by coming in contact with a rock at the side of the road. The car was helped out of the ditch by a number of bystanders and returned to the start. Here the bent rod was straightened out, and after Mr. La Roche had made a trial trip up the hill to see how the car ran after the shaking up it had received, he was given the chance of another official start, but this time one of his springs broke.

The Stevens-Duryea racing machine also started in the event for gasoline vehicles of all prices in touring trim, and made the best time in this event, but was protested on the ground that it was a stripped racer and did not comply with the rules for this event. The contestant who made the second best time in this event—P. H. Johnston, who drove a 1½ horse power Indian motor bicycle—was also protested.

The previous records for the Eagle Rock Hill were 2:42 for steam, made by W. J. Stewart in a Locomobile in 1901, and 3:45 for gasoline, made by Otto Nestman with a Stevens-Duryea in 1902. These records were beaten by quite a number of the contestants this year, but it should be remembered that last year the road surface was very soft and greasy.

It would have been interesting to calculate from the weight of the cars and the times made the actual horse power developed at the wheel rims, but any attempts of this nature are rendered futile by the fact that the weights given are in most cases catalogue weights and much greater than the actual weight of the car stripped. For instance, one of the Cadillacs was stripped, but its weight was given the same as that for the others with body on. Taking the traction resistance to be 50 pounds per ton, or 1 pound per 40, the energy required to overcome traction resistance up the hill is the same as that required to raise the car vertically $4,867 \div 40 = 122$ feet. Adding to this the 384 feet of actual rise, we find that the energy required will be the same as to lift the car 506 feet. A horse power will lift 100 pounds 330 feet in a minute, con-



Horizontal scale—1 inch = 1,000 feet. Vertical scale—1 inch = 200 feet.

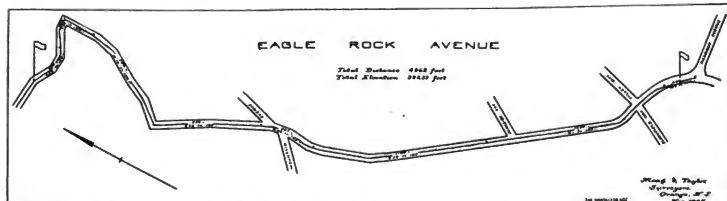
PROFILE OF EAGLE ROCK.

Results of Eagle Rock Hill Climbing Contest.

EVENT NO. 1.					
No.	Name.	Entered by	Weight.	H. P.	Time.
29.	Cadillac	Crescent Automobile Company	1,375	6½	8.19
31.	Orient Buckboard	L. J. Wyckoff	400	4	8.34
12.	Cadillac	New York Cadillac Company	1,375	6½	8.42
8.	Oldsmobile	Geo. Faddock	950	5	8.53½
10.	Rambler	H. J. Koehler	1,340	6	8.06½
9.	Oldsmobile	J. A. Plank	950	5	8.07½
28.	Cadillac	Motor Car Company of New Jersey	1,375	6½	4.17
31.	Cadillac	L. L. Chien	1,375	6½	8.05
EVENT NO. 2.					
14.	Stevens-Duryea	Motor Car Company of New Jersey	1,300	7	1.38½
10.	Franklin	American Automobile Storage Company	1,700	10	8.21½
12.	Stevens-Duryea	W. T. Baird	1,300	7	4.13½
19.	Duryea	Dr. H. Power	850	6	4.56½
EVENT NO. 3.					
30.	Locomobile	A. Phelps	1,000	4	8.54
EVENT NO. 4.					
33.	Phelps	L. J. Phelps	1,500	15	2.21½
21.	Darracq	R. T. Heitemeyer	1,600	16	3.56
26.	Peewee	Motor Car Company of New Jersey	2,000	16	4.46½
23.	Winston	Thos. McCarty	2,250	20	6.25
EVENT NO. 5.					
28.	Mors	W. K. Vanderbilt, Jr.	2,200	30	1.36½
1.	Darracq	P. A. La Roche	1,750	40	1.46
1.	Mercedes	H. W. Whipple	2,600	30	2.11
31.	Columbia	N. F. Brady	2,800	24	8.20
EVENT NO. 6.					
32.	Columbia	New York Edison Company	2,000	8	8.38½
32.	National	H. C. Whipple	1,450	5	7.39½
30.	Studebaker	Studebaker Brothers Manufacturing Company	1,550	4	8.15½
EVENT NO. 7.					
33.	Phelps	L. J. Phelps	1,500	15	2.50½
31.	Columbia	N. F. Brady	2,800	24	8.20
30.	Locomobile	A. Phelps	1,000	4	8.07½
11.	Franklin	American Automobile Storage Company	1,700	10	3.66
9.	Oldsmobile	J. A. Plank	950	5	4.07½
2.	Stevens-Duryea	W. T. Baird	1,300	7	4.03
28.	Peewee	Motor Car Company of New Jersey	2,000	16	4.09½
8.	Oldsmobile	George Faddock	950	5	4.20½
6.	Pope-Toledo	Pope Motor Car Company	2,500	24	8.10½
EVENT NO. 8.					
14.	Stevens-Duryea	Motor Car Company of New Jersey	1,300	7	1.37
36.	Indian	W. H. Sherman	90	1½	2.50½

sequently a half horse power will lift it with load will ascend the hill in 506 ÷ 165 165 feet per minute. Therefore, a car = 3.666 minutes, or 3 minutes 4 seconds. Carrying the calculation through for the wheel rims for every 100 pounds of car

with load will ascend the hill in 506 ÷ 165 165 feet per minute. Therefore, a car = 3.666 minutes, or 3 minutes 4 seconds. Carrying the calculation through for the wheel rims for every 100 pounds of car



FINISH.

PLAN OF THE EAGLE ROCK HILL.

START.



THE STEEPEST PORTION OF THE EAGLE ROCK HILL.

chine developed an average of 2.43 horse power on the rims.

The officials of the contest were: S. A. Miles, referee; J. W. Mason, of the N. J. A. and M. Club, starter; A. B. Tucker, assistant starter; S. M. Butler, Dr. J. W. English and O. J. Woodward, timers; M. L. Downs, H. H. Everett and C. H. Gillette, clerks of course.

Experience Meeting of the A. C. A.

At the club night on Tuesday, November 21, the discussion centred chiefly around the responsibility of automobilists in cases of accident, and speed arrests under the Bailey law.

President Scarritt opened the discussion and said that of late there had been much complaint in the press about reckless driving of automobiles. He referred particularly to an article in the *New York Times* of the previous Sunday, to which his attention had been called by Mr. Shattuck. The mistake made by nearly all automobiles was that they considered every automobilist a reckless driver, whereas, he was sure, the great majority were very careful and considerate. He warned his hearers not to fall into the error of their opponents, of being too radical in their statements. It must be admitted that there are some black sheep among automobilists who frequently exceed the bounds of reason in the matter of speed. He urged everyone to use his personal influence to caution friends who occasionally get reckless.

In regard to the *Times* article, Mr. Shattuck thought that most of the "facts" contained therein were obtained by a reporter from lively stable owners, who were naturally very much embittered against the automobile movement because it injured their business. One of these lively stable owners had made the statement that automobilists had a habit of running into his vehicles from behind. Mr. Shattuck pointed out that the average automobile had expensive lamps and radiators at the front.

and in case of a rear end collision with a carriage the automobile would be likely to sustain the most serious injury.

E. T. Birdsall warned everyone against passing through Rye, N. Y., where he had been arrested the Saturday before and fined \$20. He said there were four signs up in the town, and "after you have passed two signs you think you are all right—but you are not. I was told that they had recently put on a special constable and bought a new stop watch—I saw the watch—and the judge seemed to think that they ought to get back at least some of the money spent." Mr. Birdsall said that three or four other automobilists who passed through the town the same day on the way to a football game were also arrested and fined. The four signboards were certainly very deceiving.

M. M. Belding mentioned what he thought to be an exceptional case, of an automobilist receiving compensation for damages done to his car by a horse driver. His chauffeur had been downtown with his car, when the latter was bumped into by the driver of a horse vehicle, and considerable damage was done to the car. As is usual in such cases, the names of all the parties concerned were taken down, and Mr. Belding wrote to the owner of the horse vehicle, demanding payment for the damage received by his car. The horse vehicle owner replied that his horse had also received considerable injury, and thought he should be relieved from paying any damages, but Mr. Belding said that, as he thought it was well to establish a precedent, he did not let the matter rest there, but forced his claims and received full compensation.

O. A. Parker related an accident he had, in which a street cleaner was slightly injured. The accident happened on Seventy-second street, New York city, and the injured man, who was knocked down by the mudguard of the car, was taken to a physician's office across the street. Mr. Parker said it was quite evident to him that the injuries received were of a trivial nature, but the physician tried to make it out as a

serious case. It developed later that the physician had a brother, who was a lawyer, whose attention had been called to the case and who endeavored to bring a suit for damages against Mr. Parker in behalf of the injured street cleaner. Mr. Parker said that in addition to this he received notice from two other "shyster" lawyers that the case was in their hands, but he settled with the street cleaner direct, and avoided all litigation. What he wanted to call attention to particularly was that in this case the physician tried to bolster up the seriousness of the injuries received in order to get a case for his brother.

Arthur Iselin spoke of an accident he had in Boston about a week previous, which had been very much exaggerated in the papers. He was driving along at a fair rate of speed, when suddenly a cyclist rode in from a cross street and got right in front of the car. A collision was unavoidable and the cyclist broke through the glass front of the car with his head, which was the cause of the only injuries he received. No bones had been broken, as had been reported in the papers. He thought that if he had driven at a higher speed the accident would have resulted much more seriously.

President Scarritt thought that the best means of protection against lawyers who make a specialty of inducing people to bring damage suits was to take out accident policies. These policies are issued to cover all accidents, except those on race tracks, and the holder of such a policy avoids all trouble with lawyers.

On the next club night, December 8, there will be a discussion on "Hints Regarding the Operation of a Gasoline Motor Car."

A new worm gear is being introduced from Germany. It consists of a worm driving a wormwheel, the teeth of which are conical rollers. The efficiency is very high, the rubbing friction being much reduced by the rollers. Such a worm gear might be advantageous for the drive of electric vehicles.

Calendar of Automobile Dates and Events.

- December 10 to 25—Paris Automobile Exhibition.
- January 15 to 23—Madison Square Garden Automobile Show.
- January 23 to February 4—Brussels Show.
- January 25 to February 6—Meet of the Florida East Coast Automobile Association.
- February 6 to 13—Chicago Automobile Show.
- February 12 to 24—Crystal Palace Show, London.
- February 15 to 20—Detroit Automobile Show.
- March 6 to 12—Buffalo Automobile and Sportsman Show.
- March 19 to 26—Agricultural Hall Show, London.
- March 21 to 26—Washington Automobile Show.

LESSONS OF THE ROAD.



Views of a Pioneer Steam Carriage User.

By W. S. S.

This is my fourth season of experience with motor carriages. During the summer I have operated my sixth vehicle, for pleasure riding only, covering nearly 3,000 miles. Two or three times I have sent to THE HORSELESS AGE accounts of my failures and successes (over the signature "Steam Carriage"), with intent to make such comments as might be of use to fellow motorists, to those intending to purchase, and possibly to some builders who might find a useful hint in the record of a user's observations.

About a year ago I wrote in general commendation of my steam runabout then in use. Satisfied that the changes proposed for this year by its builders, both in general design and in several details are radical improvements, I sold my carriage rather than winter it, and placed an order for a new one for spring delivery. With this I have made two or three trips nearly every week of favorable weather, each confined to a single day and generally of about 50 miles, but often reaching 75, and one tour of a week covering over 300 miles. Upon this experience as a text I wish to preach a little.

REASSURANCE FOR THE TIMID.

First, I desire to add my testimony to that which has sometimes, but, I think, too rarely, appeared in your columns, to reassure the hesitating or timid man who has the idea that the operation of a motor car of any description involves endless anxiety, trouble and expense, if not great risk of bodily harm. The beginner or intending purchaser may, it is true, learn much from studying the stories of disaster contributed so frequently by those who, having come to grief or disappointment, would fain warn others what to avoid; but it seems to me it needs to be noted oftener for the general good that these are mostly trials of an exceptional character, and that few motorists of that large majority whose difficulties are but rare and slight ones, and no more important than a horse owner finds common, think to publish their satisfaction. Often, in reading the letters detailing the experience of amateurs, one cannot help feeling that they are really confessions of individual carelessness or incompetence, rather than reasonable indictments against the machines in question.

LACK OF CAUTION.

For an example of the former class, take the case of the gentleman who tells us that he went to the White Mountains in a light steam carriage having a brake

which would hold only against a forward movement. He is wise enough to provide a sprag, but it is evidently not well designed or attached. He allows himself to be caught on roads new to him, and presumably the most difficult and dangerous of his journey, in darkness and storm, and with only his wife as a companion. His steam pressure is not what it should be, and is seen to be failing, yet he attempts the ascent of a hill of unknown length and steepness, forgetting to let down his sprag. When he finds he cannot make the climb he and his wife decide to walk, and he then attempts to handle throttle and steering lever from without and coax the lightened carriage along. Steam still dropping, it runs backward down the hill, and is saved from a total wreck only by undeserved good luck! How can this sort of thing be called an accident, or be laid to the charge of the machine?

Then there is the case of your frequent correspondent from Salem, who may sometimes get a few miles away from home without a breakdown, but whose letters, as I remember them, fail to mention it if he does. His accounts are entertaining, to be sure; but they leave the impression of want of judgment in choosing a car, or want of reasonable inspection and care for it at home, or both.

UNDERSTAND YOUR CAR.

This brings me to another repetition of what can hardly be too frequently said, and I say it with strong conviction. Whatever rules are laid down for the beginner, he should surely put these into the list: Give earnest attention at the outset to acquiring an intimate personal acquaintance with your car. Run it, oil and adjust it, and even clean it, for a time, yourself. In the last named operation all its parts must pass under your notice, and you will learn much as to its construction. Get to know the sounds given out by the mechanism on the road, that your ear as well as your eye may be trained to quick appreciation of a fault or a failure. Test your car at first by many short trips, gradually lengthened; and don't be so imprudent as to indulge in high speeds or long tours, or night travel, or take women or children or old people as passengers, until you feel yourself expert, and all the motions required for tiller, valves or brakes—particularly brakes—have become so familiar as to be performed instinctively.

Then remember that comfort and pleasure on the road depend mainly on two or three things: Careful inspection and preparation of your car before starting; the habitual carrying of all tools and spare parts likely to be needed; and moderate and reasonable speeds—the slower the rougher the road.

NOT ADDRESSING HABITUAL SCORCHERS.

It will be perceived that I am not addressing those who would be long distance racers, or who are incapable of restraining themselves from the "speed

craze" and must needs risk their lives in whizzing through the country, regardless of the law and a decent respect for the feelings and the rights of others; but only those conservative people who would enjoy the new vehicle without missing it, and who are content to go, say, three times as fast and as far as horses would take them, and take cognizance as they travel of something besides the stones and ruts of the road.

Such persons, unless utterly devoid of mechanical skill and unwilling or unable to acquire it, need not hesitate to invest in any car of good repute (which is not in its first season on the market), taking the advice, if possible, of some experienced friend. They will encounter no such distressing experiences as are set forth in the columns of the papers, either funny or tragic; and they will enjoy a very great pleasure.

THE WRITER'S CHOICE.

My own preference, taking into account the roads and grades of the country surrounding me, as well as many other considerations, is for such a light steam driven vehicle as I have been operating for two seasons. When used as described it has a sufficient margin of strength and speed and will carry safely, if fairly handled, four passengers, though built for two. Provided with a buggy top and hampers "fore and aft," mine has ample comforts and luggage room enough. I have never met hills or sand or mud at which it balked. Having to spend five minutes once in 30 miles in oiling and watering is to me refreshing rather than annoying. The steam siphon supplies my water tank while the oiling is being done; and whilst it is just as well to take an occasional look at tires, running and steering gear and the outfit in general on any car. Punctured tires excluded, I have met with but one disabling accident for two seasons—the failure of a pipe joint improperly brazed—and that happened in my own yard. This season I have had but two punctures, one just as I reached home, and the other, requiring the insertion of a spare inner tube, delaying me half an hour on the road.

HOW TO DRIVE ON HEAVY ROADS.

Possibly the fact noted in the foregoing paragraph, that I have had no trouble in hill climbing or in sand or mud, needs an explanation. Of course, more power is required and less speed is expected in such cases. But I meet the demand by taking advantage of the capabilities of what I may call my power plant in this way: If I am going on unknown roads, as is generally the case, such difficulties may be encountered at any time, and I therefore use high pressures. My gasoline relief diaphragm is set for 80 or even 90 pounds, which causes no uneasiness, because only a trifling amount of fuel is under pressure at a time. This, main-

tained by a power pump, gives a fire which easily keeps the steam at from 300 to 400 pounds—very close to the latter figure at a lawful speed on a level road. Thus prepared, I am ready to "rush" almost any short incline, no matter how steep; on a long one, or with a long vista of soft sand before me, I slow down to a pace which allows the steam to remain at or near the maximum pressure, for the sake of enabling my water pump to maintain the boiler supply, the stroke of said pump being, of course, adjusted to average conditions only. With such reserves to call upon, and no chain to worry about, and assured that the engine is amply strong, and with certain safeguards in mind which shall be described later, I hesitate at nothing within reason. Those interested will recognize at once that the high boiler pressure conduces to the greatest economy of water and fuel.

My 300 mile trip was taken after running a total of over 2,000. In the course of it I allowed no hand but mine to care for the machine, and nothing happened to delay or annoy me except the puncture last mentioned. I mention this because of the common saying that the faults of a motor car are most likely to begin showing themselves after 2,000 or 3,000 miles running. My satisfactory experience is, I think, to be attributed to the fidelity with which the rules above given have been observed; though primarily, of course, to the clever design of the carriage, and in some small degree to the modifications I have made in it for my own convenience. These latter may interest other users, and therefore I venture to give an account of them.

OWNER'S IMPROVEMENTS.

First of all, as essentials not included in the original purchase, I provided two kerosene side lamps and a good acetylene headlight, a horn, which I located under the carriage for the comfort of my own ears, placing the bulb so pressure of a knee would work it; a water tank gauge, a cyclometer, discarded later for a better and specially adapted one, and, as already stated, a buggy top and two good hampers. One hamper is securely fastened behind the seat, and as it prevented filling the water tank in the usual way, I provided a special pipe with garden hose coupling, out of sight at the rear. This hamper carries storm protections of all sorts—side curtains, boot, rubber poncho, hamper covers, etc., also a tire repair outfit and other conveniences. Having rarely any other use for the front seat, I placed another hamper there, which accommodates spare wraps, camera, lunch basket, road maps, and so on.

Later I added three things which are not absolutely necessary, but which I like to have along for use if needed, namely, a steam driven boiler feed pump for emergencies, a ratchet foot brake and a sprag. As to the first, whoever has been caught

with a boiler short of water for any reason, and has wearily worked a hand pump, needs no explanation. The brake holder serves one often when obliged to stop on an incline, and is a safeguard if a woman or child is to be left temporarily sitting in the carriage. My sprag I can drop without leaving my seat. It is shaped something like a capital Y, and the forks take hold of the front axle, just inside the springs. Twenty or thirty tests of it on the worst hills I could find prove that if ever it is wanted "for business" it will be found adequate.

SMALL DETAILS MODIFIED.

It was my whim also to make several modifications in less important details. First, I put into the copper case which covers the engine four large sliding doors to facilitate oiling and inspection. The opening under the front of the seat, usually covered only by the flap of the cushion, was closed by a board hinged to the footboard, and both boards were divided in the middle, lengthwise the carriage, so that I could get at things under the seat without disturbing my companion. The seat board was hinged and given a thick permanent lining of asbestos. Under the pilot light nozzle was secured a little brass cup, holding about a dessert spoonful; this takes alcohol enough for firing up without the use of a torch. One thing which I do not venture to recommend to others, but which I feel safe in having, is a cock screwed on the end of the pipe which contains the fusible plug. Twice I have foolishly risked low water and blown out the fusible. Shutting off the fire and then the escaping steam, I have filled the boiler and completed my trip, putting in a new plug at home. If anybody copies this idea, I trust he will remember that the cock is ordinarily to remain open. Another "kink" is to have a petcock in the cylinder oil pipe, that it may be tested whether the automatic oiler is doing its full duty. Still another is to have a short S wrench made and kept handy—one end to fit all unions and check valve caps, the other all packing nuts of needle valves.

I might describe various other little changes, but any owner who takes as much interest in his machine as I do in mine will think of them for himself. Two more I will just mention: putting a valve into the main gasoline supply pipe, near the tank, and soldering most of the joints in the gasoline and cylinder oil piping.

CONVENIENCES, NOT NECESSITIES.

The novice may think this is a long list of changes to make in a new carriage, and so it is; but observe that none of them, except lamps and horn, are necessities. The rest are mainly trifling conveniences, or provisions made for rare contingencies, which most operators would hardly think worth while. Yet there is a certain anxiety in one's mind when traveling if he has not anticipated and provided for every emergency which experience indicates as possi-

ble. Of course, I carry a good collection of tools, packing, etc., which I hope never to use on the road; yet it would be foolish not to take them, especially as each year brings me a new vehicle to be tested, which may and probably will develop eccentricities peculiar to itself, just as a locomotive is said to do.

WHY STEAM IS PREFERRED.

I am accustomed to meet people who cannot understand how I can prefer a steam driven vehicle; and I have become familiar with the objections against steam which appear from time to time in the various technical papers to which I subscribe. But I notice, almost invariably, that the critic talks or writes about the designs of two or three years ago, and does not appreciate what is now being done by any one of several builders. The only unanswerable objection to a steam car is, I think, that it requires more time than any other to give it the first start of the day. But after making ready, it is, I believe, more reliable, more flexible, quieter and more easily controlled, and therefore safer. It has a motor long past experiment, practically perfect, very generally understood, and bound to operate, if given any fair chance and supplied with steam, unless actually smashed. Almost the same words may be applied to the boiler.

I am not blind to the progress made in developing so called gasoline engines, but am watching the work of certain builders with the greatest interest, in anticipation of some day owning a car free from certain objections which now seem likely to be overcome, as I felt years ago they must be.

THE IDEAL GASOLINE CAR.

My ideal will, I fancy, be multi-cylinder, air cooled, chainless, quiet running, and of much greater power in proportion to its weight than is yet common. I emphasize the last point because of certain road experiences which have impressed strongly upon my mind the great importance of a reserve of power for tight places, such as almost any steamer or even a "hay motor" can draw upon for the moment.

Meantime I feel certain also that clever design and invention in steam carriages have not yet found their limit. I read with some surprise your recent reference to the "passing" of such vehicles as I have been using for two years and propose to use next year. In my part of the country they decidedly outnumber all other kinds, and are on the increase. This may not last, but I think it will until some builder offers a "hydro-carbon" car more nearly its equivalent than any I have yet seen.

The Rothschild Cup having been definitely acquired by Serpollet at Nice last spring, he having won the race for it for the third consecutive time, M. Rothschild has offered a new cup, to be competed for under the same conditions.

The Trial Trip of a Six Ton Motor Artillery Van.

By F. H. BONNER.

Although much has been said in the press regarding the artillery van built by the U. S. Long Distance Automobile Company, most of it has related to constructive features of the car, and its probable usefulness to the artillery service. Readers of *THE HORSELESS AGE* may be interested to learn how the vehicle behaved during its trial trip from Jersey City to Washington, D. C., over all kinds of roads, through deep sand and rocks—the kind of service it is principally intended for.

After exhaustive tests of the machine in and about Jersey City, including trips through the most crowded thoroughfares to test the steering control, and the climbing of grades up to 18 per cent. to determine the hill power, the machine was pronounced by its builders as more than able to meet the requirement of the Government specifications. On November 7 an inspection of the equipment was made by the Government inspector, Lieut. Edw. O. Hearn, U. S. A. This equipment consisted of a complete blacksmith shop, a complete machine shop, a carpenter and harness maker's outfit, duplicate parts of gun mechanism, artillery wheels, wagon poles, spades, picks and jacks. After a few rearrangements of parts each compartment was securely locked and all was ready for a start.

The following morning, November 8, the start was made for Washington, D. C., in company with a tonneau which carried dress suit cases and storm coats for those accompanying the van. The route selected was by way of the Bergen Point and Staten Island Ferry to Elizabeth. Some doubt was entertained as to the ability of the small ferry at Staten Island to carry so heavy a vehicle, but apart from tipping the boat considerably no difficulty was experienced. Passing through Elizabeth, Rahway and New Brunswick, a stop was made 8 miles from the latter place, or about 40 miles from Jersey City, to examine the machinery. All was found in perfect condition, with the exception of one gear, which had not been case hardened sufficiently and showed slight signs of wear. The question of continuing the trip or replacing the gear was discussed, and it was finally decided that a new gear was the safer course. This was the first and only delay for repairs on the trip, and it might possibly have been avoided, and the car continued on its journey, but the company thought best to remedy all defects.

The machine was taken to a barn, and the accompanying party put up for the night at a farmhouse nearby, where a very pleasant evening was spent.

On November 13 we started from this place for Frankfort Arsenal, 40 miles distant, and stopped for lunch at Princeton. Our vehicle was immediately surrounded by hundreds of Princeton students, who

exhibited much interest in the wagon. Unfortunately the chauffeur took the wrong road en route to the arsenal, and we did not reach there until 6:45 p. m., and made a stop for the night. Here considerable difficulty was experienced in securing hotel room, and the party put up for the night in Philadelphia.

An inspection of the wagon at the arsenal delayed us until 2 p. m. Saturday, when a start was made for Wilmington. Now the roads were fair, and we arrived at our destination at 5:30 p. m. Hotel accommodations in Wilmington were plentiful, but trouble was found in securing a suitable place for the van, as the entrance to the stables would not permit so large a vehicle to enter.

From Wilmington to Elkton, via Hares Corner and Newark, Del., was a very pleasant ride. The roads, while hilly in some places, were very fair for automobiles. About 5 miles below Wilmington a number of horses peacefully grazed by the roadside, but took fright and ran ahead of the machine for about 1 mile, despite the efforts of several boys to drive them in the opposite direction. Only by stopping the machine and all hands assisting were they prevented from running farther.

Between Wilmington and Baltimore we were constantly subjected to a volley of questions from the farmers who wanted to know what was the use of such a "gol darned" strange machine. Lunch was taken at Elkton, and then we headed for Havre de Grace, by way of Charleston. So far we had little cause to complain of roads, but it rained all day long, and about 5 miles from Charleston our troubles began. Loose sand, in which the van would sink from 9 to 15 inches, was the rule for several miles, and in addition there was a succession of hills of from 5 to 15 per cent. to be climbed, which was a terrible test, not only of the power of the machine but of the patience of the driver as well. It is gratifying to note that not once was the engine stalled until within 1 mile of Charleston.

A touring car drawn by three draft horses preceded us on the road and at this point sunk into the sand hub deep and could not be extricated by any means at command. The car, as nearly as I can describe it, was a house on wheels for the purpose of roaming about the country in search of game, fishing, etc. The exterior was painted blue, the windows were curtained handsomely, and painted in gold lettering on the sides was "Private Car Stroller." With the aid of picks and shovels from the battery van our party tried to dig "Stroller" out, but without success. We then attempted to pass in the remaining 6 feet of road, but to our dismay we, too, sank 2 feet deep in the sand. Digging a trench, we coupled the motor to the winch on the front of the machine and tying one end of a 200 foot rope (carried for such emergencies) to a tree, we managed after pulling two trees out of the ground, roots and all,

to draw our machine to the top of the hill. We then proceeded to block our wheels with fence rails and to use the winch on the "Stroller" by passing the rope under the van and attaching it to the "Stroller." We finally succeeded and then proceeded on our journey. As two hours were spent in these operations we did not reach Perryville until 6 p. m., Sunday.

At Perryville we had to board a flat car and be conveyed by railroad to Havre de Grace, which is the only means of crossing the Susquehanna River. Another amusing incident occurred at Perryville while waiting for the train to take us across the river. A crowd of negro boys gathered around the wagon discussing its contents, and the impression prevailed that it was carrying shells and other explosives. As the train arrived our driver started the motor and an explosion in the muffler caused a panic among the youthful on-lookers.

The run from Havre de Grace to Baltimore was uneventful except for the climbing of the very steep grades at Ellicott City. At Baltimore the party was joined by Captain Wheeler, U. S. A., who accompanied the wagon to Washington. It started to rain in the morning and continued all day, making the red clay roads between Columbia and Ashton very slippery. A set of clips provided for the rear wheels prevented skidding and proved very effective for hill climbing on slippery roads. However, on very steep grades the winch was frequently put into use, and is certainly a valuable addition, as by it the deepest ruts and steepest grades were easily overcome. From Ashton to Washington we found hard roads and reached the Capital City at 10 p. m. Tuesday, with our small motor and dynamo going at full speed and the electric headlight burning brightly. We were tired, wet and muddy, but happy in the knowledge that no repair or adjustment had been necessary in the 225 miles run. Being the first artillery van built in this country and consequently an experiment, its very successful trial trip was a remarkable performance and speaks well for the character of the work in it.

Annoyances of Parisian Automobilists.

The automobilists who enter Paris are frequently annoyed by the customs officials refusing to accept their "declarations" and holding them up for fifteen or twenty minutes, during which their tool and baggage compartments are ransacked and the fuel tank is carefully measured. The A. C. F. recently appointed a committee to call upon the chief of the Customs Department with a view of remedying this evil. They made two proposals, one providing that each vehicle be authorized to carry a graduated gauge attached to the fuel tank and located outside the vehicle, and that the customs officials accept the readings of this gauge and not insist on measuring the tank.

NEW VEHICLES AND PARTS.

The 1904 Stanley Steam Car.

By ALBERT L. CLOUGH.

The Stanley steam car for 1904, as manufactured by the Stanley Motor Car Company, of Newton, Mass., presents no radical differences from the 1903 model, but a full description of the latest product may not be amiss.

The running gear consists of two tubular axes connected by a pair of hickory reaches. The underframe which is thus formed is strengthened against distortion by means of a triangular bracing. The rear axle consists of a cold drawn steel tube of 14 gauge, enclosing the axle itself, of 1 1/16 inch diameter, which runs upon four sets of ball bearings containing three-eighth inch balls. Two of the bearings are near the springs, and two of them are close to the differential, which is of the bevel gear type, containing three pinions. On the composition spider of the differential is secured a brake drum and a phosphor bronze spur gear of eighty teeth which meshes with the engine gear and constitutes the driving mechanism. The rear axle tube, as well as the front one, is strongly trussed beneath. Means are provided for adjusting the gears of the differential to counteract any wear which may take place. The front axle is of the same size tubing as the rear, and carries the inclined steering pivots, which are very substantial in character. Double elliptic springs of good length and wide spread are used throughout; the front ones have three leaves and the rear ones four. Wire wheels of 28 inch diameter are employed and are fitted with the standard form of clincher rims to fit any standard make of 28 inch by 2 1/2 inch tire. The body shows very graceful lines and provides a seat for two additional persons at the front by letting down a footboard. The space under

this seat is occupied by the gasoline tank and the gasoline pressure tank, the former of which holds 13 gallons, which is said to be sufficient to run the machine 125 miles over ordinary roads. In the extreme rear of the body is the water tank, which has a capacity of 20 gallons, and is stated to contain a sufficient supply to operate the machine for 40 miles on good roads.

THE BOILER.

The boiler is worthy of particular description. It consists of a shell of one-sixteenth inch copper tubing into the ends of which are flanged the crown sheet and the bottom sheet of boiler plate punched for the reception of the copper flues. Electrically welded steel rings are shrunk on hot to securely hold the crown sheet and bottom plate to the shell. Two hundred and ninety-five seven-sixteenth inch copper flues are expanded and flanged into the two plates, and the boiler shell is then wound with copper plated piano wire under tension—the wire covering its entire length. The boiler is then tested with 650 pounds of cold water pressure to discover any weeping or leaks. Besides the holes punched in the plates for the flues, there are additional holes punched for the superheating tubes to be described later. Special attention is paid to the flanging in of the flues in the bottom plate, their ends being completely flattened against the plate so that the fire cannot enter between the tube end and the sheet.

Toward the bottom of the water space of the boiler is inserted a tee which is closed by a plug of fusible metal. It terminates inside the boiler in two vertical tubes and constitutes the safety device, which is intended to prevent accidental burning out of the boiler. When the water has fallen below the ends of these two tubes the circulation of the liquid which has heretofore been maintained in this pipe necessarily ceases, and the fusible plug, which normally is kept from

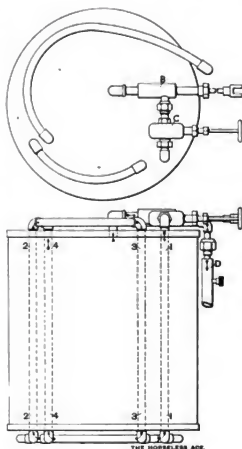


FIG. 2.—SUPERHEATING SYSTEM.

melting by this circulation of water, is soon surrounded by steam which becomes very hot and finally attains a temperature sufficient to melt the fusible plug and allow the escape of steam, which warns the operator of low water.

THE SUPERHEATING SYSTEM.

The peculiar construction of the Stanley boiler which enables a considerable degree of superheat to be maintained in the steam without the employment of metallic superheating surfaces carried at the fire temperature has already been described in these columns, but well merits a brief review. The construction (Fig. 2) which effects this end is as follows: a main steam pipe leaves the steam dome of the boiler, and after passing the working throttle B, which is of balanced construction, enters the auxiliary throttle C. The pipe then returns through the crown sheet of the boiler and passes vertically downward through the water space and through the bottom plate. There it takes a circular bend and passes upward through the bottom plate, makes a circular bend and crown sheet, where it again makes a circular bend and passes downward as before, and after passing up again terminates in the steam connection of the engine D, which is of a swivel construction, enabling the head end of the engine to move slightly in relation to the boiler. The figures in the drawing denote the vertical tubes through which the steam successively passes.



FIG. 1.—THE STANLEY STEAM CAR.

In Fig. 3 is shown the elbow for making connection between the superheating tubes and the boiler flues. The tapered end of the L is driven into the boiler flue and into the other end of the L the superheating tube is brazed.

The principle which is employed to effect superheating with this construction is that of throttling and subsequently allowing the steam to expand in the superheating tubes which are exposed to the boiler temperature. The normal boiler pressure being about 400 and the engine being capable of operating on, say, 75 pounds pressure, it is obvious that a large degree of throttling is contemplated. After the working throttle is passed and the pressure so greatly reduced by "wire drawing," there is an opportunity for the steam to expand in the superheating pipes. Steam at this reduced pressure has a much lower temperature than that of the unthrottled steam, as will be seen by reference to a steam table, but the throttled steam, being in the superheating tubes and in contact with the water of the boiler, which is at a temperature corresponding to 400 pounds' pressure, must necessarily abstract heat from it. If we assume that the steam in these pipes is saturated, it is obvious that the heat which passes in from the water space must go to superheating the steam. If, on the other hand, there is water or "priming" in the steam the heat which will then be abstracted through the tube walls from the hot water will be utilized in evaporating that priming into saturated steam at the reduced pressure or even slightly superheat the steam. The degree of superheat which will be attained by this arrangement under a given throttle opening will be in proportion to the original dryness of the vapor received from the boiler. Superheated steam furnished to the engine results in very marked fuel economy, a minimum of cylinder condensation and in an exhaust which contains so little water as not to be objectionably noticeable. Furthermore, as by superheating the vapor a larger amount of energy is imparted to each pound of it, a given quantity of water will carry the car farther than would otherwise be the case, resulting in an extensive radius of action.

WATER LEVEL INDICATOR.

The maintenance of a water gauge of the ordinary form upon a boiler carrying 400 or 500 pounds pressure would be almost impracticable, and the Stanley Company has discarded this objectionable piece of apparatus in favor of a mechanical water level indicator, which is designed to advise the operator either by sight or by touch as to the condition of the boiler. The arrangement consists of a chamber, very much like the ordinary water column, provided with try cocks and piped into the boiler in the ordinary manner. In this chamber is suspended a hollow brass float to which is attached a cable running over a sector carried by a light and accurately constructed pivot passing through the wall of the chamber and provided with a steam tight packing. This pivot carries on its extreme end a wheel, upon which runs a cable suspending a lead counterweight which is so proportioned as to balance the float when it is partially full of water. This pivot also carries a wire indicator in a position within easy reach of the operator's hand so that by touching it he can determine its angular position, from which by experience he can accurately judge the position of the float. The tendency is for the float to fall in the chamber until it is partially submerged in the water, when its weight becomes less, and finally balances with the lead counterpoise. As the water level drops more of the float is left out of the water and its effective weight becomes greater, overbalancing the counterpoise and sinking into the liquid with a corresponding movement of the indicator. It is possible after a little experience to judge by the "feel" of the indicator whether the float is touching the water or not and quite an accurate estimate of the water height may be made.

THE BURNER.

The Stanley burner is of peculiar construction. The round burner plate is a thin iron casting bearing raised parallel corrugations which cross the circular plate as equidistant chords. These raised portions have transverse slots about one-quarter of an inch apart, which are the gas outlets. The pilot light is formed by a

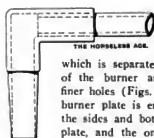


FIG. 3.

small comparison in one of these raised corrugations,

which is separated from the rest of the burner and slotted with finer holes (Figs. 4 and 5). This burner plate is entirely closed at the sides and bottom by another plate, and the only opening into it is the air inlet into which is directed the gas nozzle. The mixing of the gas and air is very simply effected by a mixing plate. The pilot light compartment receives gas and air in the same manner. The gasoline coming from the gasoline pressure tank passes through a coil of brass pipe above the boiler flues and then passes to the burner, where it passes twice through the fire before entering the mixing chamber.

GASOLINE FEED SYSTEM.

The carrying of large quantities of gasoline under a heavy air pressure is rightly regarded as a dangerous practice, and in the Stanley car this danger is minimized, as only about a pint of the fuel is under pressure. The gasoline is taken by gravity from the supply tank, which is at atmospheric pressure, into the gasoline pump, which is operated mechanically from the engine, and is thence forced to an automatic diaphragm which controls a bypass leading back to the tank. The gasoline thence may pass to the gasoline pressure tank, a small metal vessel carried in the bonnet of the car. As there is no outlet from this tank except to the burner the air in it is compressed as the fuel is forced into it, until a pressure of about 90 pounds is attained, when the diaphragm opens the bypass and allows the pump to return the excess of gasoline to the tank until such time as the pressure falls somewhat below 90 pounds, when the bypass is closed and pumping into the pressure tank is once more resumed. As it is desirable that the gasoline shall not become saturated with air, the pressure tank is ingeniously arranged so that there will always be a layer of glycerine between the air and the gasoline. The amount of fuel under pressure in this small receptacle is sufficient to

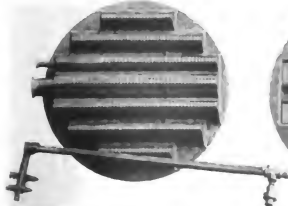


FIG. 4.—TOP VIEW OF BURNER.

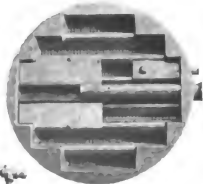


FIG. 5.—BOTTOM VIEW OF BURNER PLATE.



FIG. 6.—BURNER CASING.

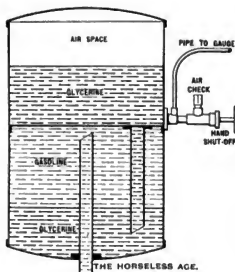


FIG. 7.—PRESSURE TANK.

maintain the pilot light burning for about three hours. If the carriage is left standing for any length of time it will be necessary to pump gasoline into the tank by means of a hand gasoline pump conveniently provided.

THE ENGINE.

The Stanley engine is of the double acting, double cylinder, horizontal type, with Stephenson link reversing gear. It carries a steel spur gear of thirty-six teeth on its crank shaft, which meshes with the gear on the differential, and the engine frame extension carries circular straps, which encircle the rear axle tube and constantly maintain the proper relation between the engine and the driven axle. The head end

of the engine is strapped to the carriage frame. The cylinders are $3\frac{1}{4}$ inch stroke by $2\frac{1}{2}$ inch bore, and the cut-off is set at five-eighths of the stroke. The steam chest cover is easily removable, giving access to the two slide valves, which are correctly ground by special machinery. The pistons each carry two broad packing rings fitted with great care, and the piston rods are riveted into the piston heads. All bearings in the engine, with the exception of the wrist pins, are of the ball type, including the crank shaft bearings, crank pins, eccentric rod straps and the guides. Two of the four eccentrics are integral with the crank shaft, and the other two are made fast with special care to prevent slipping. The engine crosshead actuates a linkage supported on ball bearings which operates the water, gasoline and oil pumps, and this linkage is capable of adjustment to secure a variable throw on the water pump. A copper jacket encloses the engine cylinders, and a removable burnished copper casing completely protects from dust the whole engine, the differential gear and the brake. A pedal operates the reverse, and it is automatically restored to the forward position by a spring. Cylinder lubrication is effected by a positive, mechanical force feed lubricator, which consists of a piston pump drawing cylinder oil from a tank of large capacity and forcing it directly into the main steam pipe, where it enters the cylinders. The pump has sufficient force to drive the oil against the maximum boiler pressure, and it is operated by means of a cylindrical cam, which is given a slow motion by a ratchet and pawl device moved by the

pump linkage. Water is supplied to the boiler by a piston pump of large capacity and capable of a variable throw, which is operated as before described. A manually operated bypass serves to divert any water which is not needed by the boiler feed back to the supply tank. There is also a water hand pump of the usual folding variety.

Steam pressure is automatically maintained by a diaphragm, which acts to cut off the gasoline supply absolutely from the main burner whenever the pressure exceeds 400 pounds or thereabouts, and to open the supply when the pressure falls much below that figure. The engine exhaust is piped into the stack and escapes with the products of combustion, at the same time aiding in the draft. Before reaching the stack it has been passed through the usual form of muffler. A galvanized iron hood gathers the spent gases from the top of the boiler and conveys them to the rear of the water tank, where the stack deflects downward and discharges its contents toward the ground. As the burner is entirely enclosed there is no likelihood of its being blown out by outside air currents, and all the air which is used in combustion is drawn in through the single aperture at the burner.

GENERAL CONSTRUCTION FEATURES.

All piping in the car is of brass and all check valves are of an improved type, making use of steel balls instead of conical checks. All pumps and piping are protected from road dirt by the flooring of the carriage, which arrangement also conduces to safe operation in cold weather.

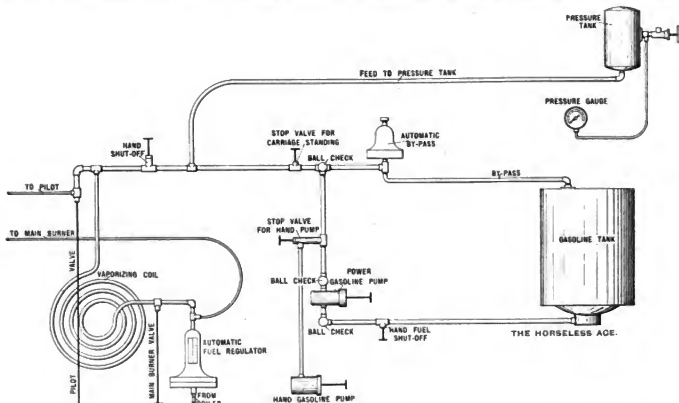


FIG. 8.—GASOLINE FEED SYSTEM.

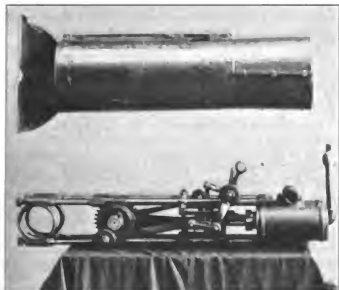


FIG. 9.—SIDE VIEW OF ENGINE AND CASE.

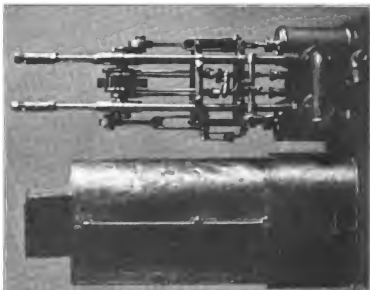


FIG. 10.—TOP VIEW OF ENGINE AND CASE.

Every one of the controlling devices is easily reached from the seat, including the water bypass, main burner shutoff, pilot light shutoff, main gasoline shutoff and water level indicator. The equipment includes an ejector for filling the water tank, together with sufficient rubber suction hose, which is carried on hangers around the body frame. The pedal operated brake is of the double acting variety, and the usual leather strap is superseded by a specially prepared canvas band, which will not absorb oil. The centre tiller form of steering is retained.

The weight of the car is about 1,000 pounds, with all supplies on, and it has a wheel base of 78 inches, with a 54 inch gauge.

The Stanley Company are building a large new factory and preparing for an output of 1,200 cars during the coming season.

The Columbus Gasoline Car.

Rodgers & Co., of Columbus, Ohio, are manufacturing several models of gasoline cars with air cooled motors, one of which is illustrated herewith. The motor employed is a double opposed cylinder one, fully encased and protected from dirt and dust. The engine and working parts are located under a front hood, and are readily accessible. The most interesting feature of the engine is the air cooling system. The cylinders are provided with radiating flanges and on top of the crank case is placed a peculiarly shaped ventilating stack. A fan at the end of the crank shaft forces a strong current of air against the cylinder walls when the engine is running. The crank case of the engine acts as a pump, drawing in the charge of air at each outward stroke of the pistons and forcing it out during the inward stroke. The rapid circulation of air in the crank case thus obtained results in the piston and cylinder walls being kept cool. We are informed that

test runs of from 50 to 75 miles at an atmospheric temperature of as high as 95° Fahr. have shown the practical efficiency of this cooling system. Runs of the length mentioned were made without a stop, and the engine never stuck or caused trouble.

The drive is chainless, by bevel gears, and the transmission is of the sliding gear type. The car is equipped with Midgley tubular steel wheels, 30 inches in diameter, which are shod with 3 inch Goodrich clincher tires for the smaller cars and 3½ inch for the heavier cars. The cars have two brakes, one a band brake on the driving shaft, and the other a double expansion brake acting directly on the hubs of the rear wheels. A more complete description of the mechanical parts of the car will appear in a succeeding issue.

Trade Literature Received.

Hyatt Roller Bearing Company, Harrison, N. J.—Catalogue of the Hyatt flexible rollers as applied to roller bearings.

The Electric Contract Company, 202 and 204 Centre street, New York.—Catalogue

of dry batteries, electrical novelties and automobile specialties.

Moore Smith Company, 250 Devonshire street, Boston.—"Fur Coats and Robes for Automobilists."

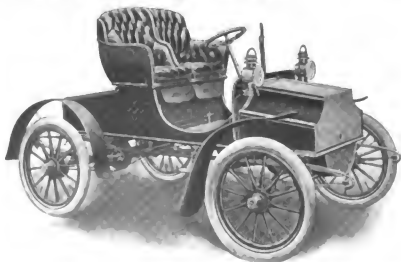
New Incorporations.

Ottawa Motor Company, Ottawa, Ohio. —Incorporators, E. R. Eastman, Joseph H. Gosling, F. H. Gruderman, E. L. Frey and Frank G. Kohle; capital, \$30,000.

Reliance Kerosene Motor Company, New York.—Capital, \$100,000; directors, F. L. Nichols, of Stamford, Conn. and O. G. Zeuschner and E. H. Sharrott, of New York.

The American Saddle Company has been incorporated under the laws of New Jersey; capital stock, \$50,000; to engage in the manufacture of automobiles, motors, etc. Among those interested are Albert L. Pope, Albert A. Pope and I. G. Davis.

The Reliance Motor Cycle Company, Addison, N. Y.—Capital stock, \$15,000. Incorporators, Willis H. Ives and Charles D. Reynolds, of Addison, N. Y., and J. Frederick Dell, of Buffalo. To manufacture motor bicycles.



COLUMBUS GASOLINE RUNABOUT.

Cushion Tires.

Since the regular pneumatic tires are the cause of a great deal of trouble to the average automobilist, and since solid rubber tires are evidently unfitted for cars of such high speed as are now generally demanded, a good deal of interest naturally centres in cushion or airless tires—a type occupying an intermediate position between the pneumatic and the solid. The class of cushion tires is not strictly definable, but in it may be included the entire range of tires from those which are practically solid, except for a small hole through their centre, to those which are actually single tube pneumatics, but which, owing to interior projections, may be run deflated a considerable distance without harm.

It will be understood at the outset that cushion tires in general are less resilient than pneumatic tires. If the advantage of immunity from punctures and bursts could be secured without a sacrifice in resilience the pneumatic tire would certainly be doomed, but this is quite impossible. All that can be expected of the cushion tire is that it provide enough cushioning effect to protect the car, and particularly the driving mechanism, from damaging shock. The cushion tire should be particularly suitable for small runabouts, as the average speed of these cars is not as high as that of touring cars. On very heavy cars of slow speed probably the solid tire would be preferable.

About two years ago a very heavy walled pneumatic tire was placed upon the market and was pushed considerably at the time. It was claimed for it that it was practically unpuncturable, owing to the unusual thickness of wall. Apparently it did not prove quite satisfactory, for little is heard of it nowadays. One of the troubles with it, we believe, was that, owing to the great proportional amount of fabric in its make-up, it stretched very badly on the rim, and was then hard to keep in place.

THE BENOCA TIRE.

Of actual cushion tires made for automobile purposes the one which has been on the market longest is the Beasley or Benoca, manufactured by the Standard Anti-Friction Equipment Company, of

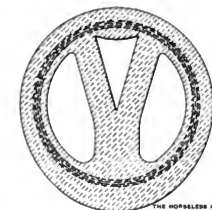


FIG. 2.—THE PAWKES AIRLESS TIRE.

New York. The construction of this tire is the same as that of a single tube pneumatic tire, except that the inner rubber lining is provided with V shaped ribs. This inner rubber part with the ribs is referred to as the "elastic" part of the tire. It will be noticed that the elastic part of the tire is divided in a vertical plane (with

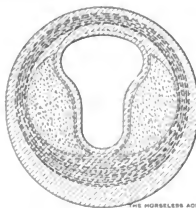
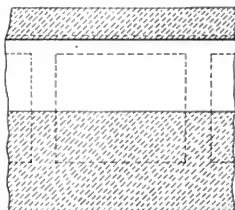


FIG. 3.—THE TENNANT TIRE.

reference to the position of the tire on a vehicle), and that the two halves are displaced relatively to each other, so as to bring the point of a V rib of one of the parts midway between the points of two adjacent V ribs on the other part. When the tire is unloaded the two halves of the flexible part lie close together, but when it is under load and the tire is distended

they separate, as shown in Fig. 1. The outer part of the tire is made of rubber and fabric in the usual manner. This tire is manufactured in sizes of 2½ and 3 inches, the latter size being said to be large enough for machines weighing with load not over 2,000 pounds.

THE PAWKES TIRE.

The Pawkes "indestructible airless" tire, made by the Pawkes Rubber Company, of Denver, Col., is in many respects similar to the Benoca tire. The internal space of the tire tube contains ribs substantially of V form, but the V is located in the cross section of the tire tube instead of at right angles to it, as the V in the Benoca tire. In addition to these V ribs, which run all around the tire, there are cross ribs at intervals, connecting the arms of the V with the outer tube wall. The space between the arms of the V is left free all around the tire, and this allows the tire to distend freely under load, thus insuring the requisite cushioning effect. The open space between the arms of the V serves therefore essentially the same purpose as the division in the elastic part of the Benoca tire. The core, consisting of the V ribs and cross ribs, is united to the tire by vulcanization.

THE TENNANT TIRE.

The tire manufactured by the Tennant Auto Tire Company, of Springfield, Ohio, is a pneumatic tire with provisions preventing it from collapsing when deflated, and special provisions for preventing puncture. In the side walls of the tire, between the fabric and the inner rubber tube, are formed pockets which are filled with sponge rubber, a readily compressible, elastic material.

In the tread of the tire is embedded a protecting strip made of similar material as the tread, but of greater hardness, so as to prevent cutting, which is inevitable when the materials of the strip and the tread are entirely dissimilar, as, for instance, metal and rubber. Belata gum, suitably compounded with sulphur and other ingredients to give it the desired hardness, is used for this purpose. The

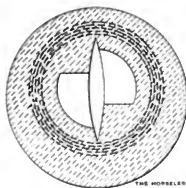
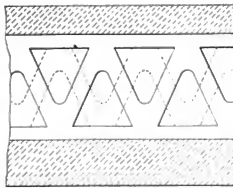


FIG. 1.—THE BENOCA ELASTIC TIRE.



protective strip being of a similar material has sufficient flexibility and a sufficient surface area at its edges to overcome any cutting tendency, thereby increasing both the durability and resilience of the tire over a similar tire employing a metallic protecting strip, while the protection against puncture obtained by the use of the protecting strip of similar material is sufficient for its purpose. It will be noticed that the protecting strip has a considerably greater width than the central air chamber. The strip is partly cured before being placed in position in the uncured tire, and the curing of the strip is completed during the curing of the tire.

The protecting strip is claimed to be of such hardness that it will deflect any nails, etc. The shape of the tube, together with the protecting strip, causes the tire when inflated to have a very narrow tread, which is advantageous for several reasons.

THE FEAR-NAUGHT TIRE.

This tire is the invention of Dr. T. J. Cooper, of Paterson, N. J. The inner opening of the tire is divided by a central

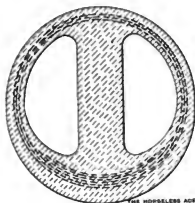


FIG. 4.—THE FEAR-NAUGHT TIRE.

vertical partition wall or core into two separate air chambers. The core is constructed entirely of soft rubber and is vulcanized to the wall of the tire. The central core is claimed to reduce the probability of puncture by 95 per cent., and to make the tire entirely non-collapsible. Most of the sharp objects picked up by the tire would penetrate into the core, where they could do no harm, and if one of the air chambers should accidentally be punctured the other chamber would still remain inflated. However, the central core alone would prevent any damage being done to the tire in such a case. The tire is made either with or without lugs, making it possible to fit it to any form of rim. The lugs are embedded in the central rubber core, away from the air chamber, so there is practically no danger of leakage around the lugs.

The two chambers are inflated at the same time, the passage through the tire valve branching out into the two chambers, and each branch passage being provided with a flap valve at the inside of the air chamber.

COMMUNICATIONS.



The Eagle Rock Hill Climbing Contest—Handicapping.

Editor HORSELESS AGE:

The writer participated in the hill climbing contest on Eagle Rock Hill on Thanksgiving Day, running a 4 horse power steam Locomobile weighing about 1,000 pounds, and costing \$850 (not \$950, as printed in the programs) in event No. 3 for steam carriages of all kinds. I made the run in 3:54, and in event No. 7 I made the run in 3:37½, there being only nine cars which made better time.

On account of the extremely cold weather it was a hard trial for steam cars, as it was hard for the boiler to generate steam in such a frosty atmosphere, but it must have been an ideal day for the gasoline cars, as the cold air kept the water in their tanks cool, and hence the cylinders were in no danger of overheating at any time. With the steamers it was different; it was hard work to keep the small water pipes leading from the tank to the pumps from freezing. My steam water pump froze solid and then burst; that is, the water cylinder split from the top to the bottom, ruining the pump completely. The check valve near the pump also froze and burst, and was entirely ruined. I cut off the pump from the pipe leading to the boiler and plugged the T fitting connecting the pipe to the heater and muffler. My steam pump being rendered useless, I had to depend entirely on the crosshead pump, which never failed to do its work and kept the boiler well supplied. Still, in order to keep this pump from freezing, I had to run the car around considerably while awaiting my time to climb the hill. There were a number of cars at the hill that experienced freezing troubles. A Prescott steamer had its water pipes frozen and burst, while a gasoline car had its circulating pump frozen and burst.

If the morning had been pleasantly warm I believe I would have climbed the hill in two minutes, for last July, with nearly 500 pounds more weight than I carried in the run on Thanksgiving Day, I climbed this hill in just four minutes, and near the top, at the steepest part of the hill, we had to plow through a lot of fine stone that had been washed in the roadway by a recent rain; this greatly retarded our progress. The road is now in the best of condition.

The contest on Thursday could not have been managed better than it was. The officials were uniformly courteous, and I believe showed no partiality to anyone; their conduct in managing this affair has been spoken of in the highest terms. I think, however, there is one point in the rules to which exception might be taken. I refer to the classifying of the various cars by what they cost their owners, and not by the horse

power and weight. It seems to me that the high power cars with relatively light weight should be handicapped. What show has a 4 or 5 horse power machine, weighing 1,000 pounds or more, with one of 30 to 40 horse power weighing 1,800 to 2,000 pounds? It must be obvious to anyone that the 5 horse power car must move a weight equal to 200 pounds per horse power in competition with a 40 horse power machine weighing 2,000 pounds, or only 50 pounds per horse power. I think the little fellow, under such conditions, has a poor show of lifting the cup. Will the gentlemen promulgating such racing rules kindly enlighten us through *THE HORSELESS AGE* on this subject? A. PHELPS.

Wants to Improve on the Manufacturers.

Editor HORSELESS AGE:

I intend to build (or rather to assemble) a gasoline runabout, in accordance with some ideas I have regarding convenience, power, etc., and would like your advice on one or two points in connection with this matter.

I want to put together a light weight car of the runabout pattern, to weigh not over 800 pounds, with a two cylinder 8 horse power engine. Which style of engine, vertical or horizontal opposed, would probably be the easiest to work on, and what are the advantages of the one style over the other in the light car I propose to build?

Is there an 8 horse power double horizontal opposed engine made which is air cooled; and which would be better for me, air or water cooled?

Again in the gear: Would the planetary system of gear be better than the sliding gear in a light carriage? And if so, why?

I have been using a runabout of about 4½ horse power for six months, and have had more than my share of trouble, and I can truthfully say that 90 per cent. of it has been due to constructional errors in the car itself.

In the first place the builders, in order to give the car a cute look, sacrificed every inch of luggage space. Just imagine starting out on a little country jaunt without a pump or a little repair material for a punctured tire! I bought two new tires in the first sixty days; then I got onto the trussed or semi-solid tire, and had no more tire trouble.

Then the radiator is put up flat under the body of the car, where the air can by no possible chance touch it. This, of course, requires the driver to get out every 15 miles to refill the water tank.

My wife and I were out one Sunday afternoon, 15 miles from home and running nicely, expecting to get in for tea, when the circulating pump worked loose from the angle iron support, and our cylinder got too hot to run. Two cap screws hold this pump, and one turn with a

wrench will tighten them, but the battery box sets down flat on them, and it is necessary to take out the batteries and take the box off. This box is held by six screws, but the coil box is in the way, and so we took out the coil, took off the box, disconnected all the batteries, took out that box and then tightened the pump with two or three turns of the wrench. Then the boxes, batteries and coil were replaced. It required just one hour and forty minutes to do something that should have taken five minutes.

I was very proud to know my carriage had an emergency brake. I felt secure in climbing hills, knowing that nothing could happen. One day I went up a little hill of not over 8 or 10 per cent, and when near the top the driving chain broke, and the car started backward down hill; I threw in my emergency brake with all confidence, but I went right on down hill into a tree, and it cost me a tow into the city and \$25 for repairs. While I was waiting for the repairman to fix me up I spent my time in figuring out why that emergency brake didn't work. I found that the spring clips which surround the sleeve carrying the rear axle merely clutch the sleeve by friction; consequently, when the brake is thrown on a drum several times larger in diameter than the axle sleeve, the latter turns, thus throwing the brake out of commission.

But as I look back at these things I see I never really knew what trouble was until I undertook one day to replace a worn out high speed clutch. I really hate to tell the trouble I had, because you will be loath to believe me. The high speed clutch is operated by a bevel collar slipping up under four fingers, which in turn force four leather covered springs against a cast disk. The four fingers were so badly worn where they came in contact with the collar that they failed to engage and lock the gear.

Well, I got a new fitting containing the new fingers and springs to go on the main shaft of the engine. I saw we would be obliged to take the body off the running gear, and this we proceeded to do as follows: "The body is held on by only four bolts," the makers say, which is true as far as it goes. However, to remove the two rear bolts we had to take off the muffler and the gasoline tank. Then we disconnected the priming wire, the compression relief wire, the rod running to the gasoline needle valve, the accelerator wire, the brake wire and the emergency brake cable. This sounds easy, but all of these connections are in a space not over an inch and a half in size, and it takes half an hour to do it. Then the battery and coil connections had to come off; then the rubber pipes to the radiator. The front mud guards are fastened to the body and to the running gear. They, too, must be removed, and then the steering tiller disconnected from the running gear.

Now take out the other two bolts men-

tioned before as holding the body on, and are we ready? I should say not! The handle controlling the forward and reverse speeds coming up at the end of the seat must be taken off. To do this we have to take off the three band brakes on the gear case, knock a pin out of the controlling handle, and shove the rod back into the body so as to free the body. Then finally we lift the body off, loosen all the bolts holding the engine in place, lift it to one side, so the shaft can slip from its bearing, and finally replace the worn fitting with the new one. Then we retrace our steps. After just ten hours' hard work we are ready to go out on the road.

Now these are the two most vulnerable parts on a carriage of this character—this four finger piece and the small front sprocket. These two pieces are subject to very rapid wear and require frequent renewals, and when the necessity for such renewals arises it makes one sick at heart to think of it.

You will now understand why I am going to assemble a car myself. I am going to put in two cylinders for a steadier pull, and want higher horse power for general efficiency; vulnerable parts so arranged that they can be replaced on the road, if necessary; a body designed to look well, with a moderate luggage capacity, and springs so arranged that a heavy man on one side and a light one on the other will not throw the front and rear axles out of parallelism, which tends to steer the carriage continually to one side. Then, also, I will use good non-puncturable or trusted tires.

M. E. DICUS.

[We fear you are laboring under a misapprehension regarding possibilities in automobile construction in the present state of the art. You seem to take it for granted that it is possible to build an 8 horse power car, with luggage space and with every part perfectly accessible, to weigh not more than 800 pounds. This result may be within the limits of possibility, but we are most certain that it cannot be accomplished with the parts purchasable in the market, and have every part of the car of adequate strength. If your engine gave 8 horse power on the brake and you arranged your parts on the car in such a manner that every one of them could be gotten at readily, and the body was provided with luggage room, the car would probably weigh nearly 1,500 pounds. In all light runabouts the parts are brought close together to save weight in frame and body.]

A double opposite cylinder engine is more free from vibration than a double cylinder vertical one. The double opposite cylinder engine requires a rather long body, and some of the valves and igniters would not be as accessible as those of a vertical cylinder located in front.

Whether the planetary or shifting gear is the better depends largely upon the ratio of power to weight. If you had 8 actual horse power and only 800 pounds weight

of car the planetary gear would undoubtedly be best, as you could take nearly everything on the high gear, and then the transmission would be running free. If, however, your car should weigh nearly 1,500 pounds, the shifting gear might be preferable. In general the planetary gear is the most satisfactory for running on high gear and the sliding gear for running on low gear.

We know of no 8 horse power two cylinder opposed motors, and believe you will have to use a water cooled motor.—Ed.]

Oil for Cooling Engines.

Editor HORSELESS AGE:

I have read your several articles on anti-freezing solutions, but have myself been using oil for this purpose during the past winter. I use a thin machine oil, which costs 25 cents per gallon. The advantages of oil are that it perfectly lubricates the pump; takes care of the heat very satisfactorily, and is perfectly safe in any weather, as far as freezing is concerned. There is no disagreeable odor.

J. W.

Exhibitors at the Madison Square Garden Show.

According to the list just issued, there will be 152 exhibitors at the coming New York Show, occupying 239 spaces. No one concern is given more than four spaces. Of this number eighty-eight are builders of complete vehicles. About fifty concerns were unable to secure space, notwithstanding the fact that every available space in the big amphitheatre will be given over to power driven machines during that week. Foreign machines will be exhibited in the restaurant spaces. Following is the list of exhibitors:

PLATFORM AND MAIN FLOOR SPACES.

Hartford Rubber Works Company.
Gleason-Peters Air Pump Company.
Fisk Rubber Company.
Auto Supply Company.
Grout Brothers Automobile Company.
Hoffman Automobile Company.
Buckmobile Company.
Ford Motor Company.
Holley Motor Company.
Regas Automobile Company.
Desberson Motor Car Company.
Buffalo Electric Carriage Company.
U. S. Long Distance Automobile Company.

pany.
B. V. Covert & Co.
Firestone Tire and Rubber Company.
The Walter Car.
J. Stevens Arms and Tool Works.
H. H. Franklin Manufacturing Company.
Waltham Manufacturing Company.
Prescott Automobile Manufacturing Company.
Automotor Company.
Crest Manufacturing Company.
Charles E. Miller.
Goodyear Tire and Rubber Company.
Columbia Lubricants Company.

Diamond Rubber Company.
 George N. Pierce Company.
 Knox Automobile Company.
 Autocar Company.
 Peerless Motor Car Company.
 Matheson Motor Car Company.
 Kirk Manufacturing Company.
 Woods Motor Vehicle Company.
 Thomas B. Jeffery & Co.
 Olds Motor Works.
 Upton Machine Company.
 White Sewing Machine Company.
 Electric Vehicle Company.
 Apperson Brothers Company.
 Haynes-Apperson Company.
 Winton Motor Carriage Company.
 Pope-Robinson Company.
 Pope Motor Car Company.
 Locomobile Company of America.
 Berg Automobile Company.
 Vehicle Equipment Company.
 Studebaker Brothers Manufacturing Company.
 Elmore Manufacturing Company.
 Baker Motor Vehicle Company.
 Packard Motor Car Company.
 National Motor Vehicle Company.
 F. B. Stearns Company.
 General Electric Company.
 Cadillac Automobile Company.
 E. R. Thomas Motor Company.
 Gibbs Engineering and Manufacturing Company.
 Duryea Power Company.
 Springer Motor Vehicle Company.
 CENTRAL AND FIRST TIER BOXES.
 Hyatt Roller Bearing Company.
 B. F. Goodrich Company.
 Emil Grossman.
 Continental Caoutchouc Company.
 National Carbon Company.
 Leon Rubay.
 Manhattan Lamp Works.
 Automotor Company.
 Dayton Electrical Manufacturing Company.
 Whitney Manufacturing Company.
 Whitlock Coil Pipe Company.
 Electric Contract Company.

BALCONY SPACES.

Cole & Woop.
 Hendee Manufacturing Company.
 Champion Manufacturing Company.
 Dow Portable Electric Company.
 G & J Tire Company.
 Standard Welding Company.
 American Ball Bearing Company.
 R. E. Dietz Company.
 Universal Jack and Power Company.
 Federal Manufacturing Company.
 Imperial Wheel Company.
 Gray & Davis.
 Youngs Automobile Company.
 Briscoe Manufacturing Company.
 C. J. Ivon Company.
 Badger Brass Manufacturing Company.
 Post & Lester & Veeder.
 T. J. Wetzel.
 Shelby Steel Tube Company.
 B. F. Goodrich Company.
 Midgley Manufacturing Company.
 Pope Manufacturing Company.

Twentieth Century Manufacturing Co.
 Whalebone Rubber Company.
 Stodder Tire Company.
 Rose Manufacturing Company.
 Herz & Co.
 C. F. Splittdorf.
 A. H. Funke.
 Atwood Manufacturing Company.
 Motor Cycle Manufacturing Company.
 Detroit Motor Works.
 Scoville & Peck Company.

EXHIBITION HALL SPACES.

Mack Brothers Company.
 Rodgers & Co.
 Brennan Manufacturing Company.
 Hollander & Tangeman.
 Union Automobile Company.
 Sandusky Automobile Company.
 Springfield Automobile Company.
 Elwin L. Smith.
 Phelps Motor Vehicle Company.
 J. H. Dawson Machinery Company.
 Chelsea Manufacturing Company.
 Michigan Automobile Company, Ltd.
 Newbury & Dunham.
 Howard Automobile Company.
 Rochester Steam Motor Works.
 Fischer Motor Vehicle Company.
 Graham-Fox Motor Company.
 Northern Manufacturing Company.
 E. W. Bliss Company.
 Electric Storage Battery Company.
 Reid Manufacturing Company.
 Wheeler Manufacturing Company.
 Model Gas Engine Company.
 Columbus Motor Vehicle Company.
 Coldwell Lawn Mower Company.
 O. K. Machine Company.
 H. H. Buffum Company.
 Société Franco-Américaine Automobile
 Company.
 Richmond (Ind.) Manufacturing Company.

C. A. Duerr & Co.
 W. Irving Twombly.
 Kensington Automobile Company.
 Timken Roller Bearing Company.
 Lackawanna Motor Company.

RESTAURANT SPACES.

Moyea Automobile Company.
 Standard Automobile Company.
 MerceDES.
 Smith & Mabley, Incorporated.
 Georges-Richard-Brazier Company.
 S. B. Bowman Automobile Company.
 F. A. La Roche Company.
 Panhard-Levassor Company.
 Kenneth A. Skinner (De Dion).
 Central Automobile Company.

EXTRAS.

J. M. Quinby & Co.
 E. J. Willis Company.
 Morgan & Wright.

The Southern California Races.

The two days' races on the Agricultural Park track, Los Angeles, on November 20 and 21, are notable because the world's track record for the mile was there reduced to 55 seconds by Barney Oldfield. On the first day, Friday, November 20, Oldfield broke the mile record twice. The day was perfect for driving and the track was in fine condition. The programmed races of the day were processional affairs and uninteresting save for the fourth race, which was close and fast, won by Saunders in the Toledo machine. Beyond this race there was nothing exciting as a race, but the big crowd stayed the program through.

The special race for the Huntington \$1,000 perpetual challenge cup called out five entries. At the last moment the Franklin racer and a White were entered. The other entries were Garbutt's reconstructed



H. T. RYUS IN WHITE RACER, WINNER OF THE HUNTINGTON PERPETUAL CHALLENGE CUP AT THE SOUTHERN CALIFORNIA RACES

White touring car, Peyton's Tinscher car and a Toledo entered by the National Auto Company. As has already been noticed, the race was won by H. D. Ryus, driving a White.

The first race was for gasoline cars only, weight 1,000 to 1,500. There were but three entries, and Hansen (Tourist) jumped away in front and stayed there till the end, winning with a lead of about half a mile. Time for the five miles, 7:43. A Rambler, driven by Cowan, was second, and a Shepherd, operated by Ross Roster, quit at the end of the second mile.

There were five cars out warming up for the second race. Hansen (Tourist) went away again in the lead, but the Franklin, driven by Winchester, was in the race and came from the rear, passing Hansen at the end of the first mile. After that it was a walkover for Winchester. Time for the five miles, 7:11½.

The third race proved a disappointment. There were two entries, the Franklin and Frank Garbutt's White touring car. Garbutt went wrong before reaching the first quarter pole and stayed there, while the Franklin reeled off five miles in 7:08.

The fourth race was the only real contest of the day. Four cars went away at the crack of the gun—a Tourist, a Tinscher, a Toledo and a Mercedes. Hansen (Tourist) got away ahead, but in the back stretch Saunders (Toledo) made up and continued gaining on the turn, passing the Tourist at the end of the first mile. Bruno Seibel, who drove the big Mercedes, began to cut the corners and take long chances, coming up from the rear with a rush. He managed to get in ahead of the Tourist on the third mile, but the German machine was not equal to the task of catching the Toledo. The Mercedes took second by a quarter of a mile, and the best the Tourist could get was third by half a lap. Time for the five miles, 5:52½.

In the next event there were only two starters, a White and a "Coyote." It was practically a walkover for the White, which made a time of 6:25.

In the next event, an Australian pursuit race, the Franklin started at the quarter pole, the Tourist at the half and a Buckboard at the three-quarter pole. The Franklin got away on the jump and steadily overhauled the Tourist, and then went after Hamlin (Buckboard), ending the race by catching him inside of a mile and a half.

SATURDAY'S RACES.

Barney Oldfield continued the star attraction on Saturday, which was not to be wondered at after his performance on Friday. Aside from the events in which Oldfield participated the day's events fell somewhat flat, there being no close finishes.

The opening race proved to be a procession, headed by Shettler's Oldsmobile, with Cowan's Rambler second. Time for the five miles, 8:09½.

In the second race Flint's Stevens-Duryea won from Eagar's Rambler by three-quarters

of a mile. Flint's time for 5 miles was 7:50½.

The Australian pursuit race followed, and in this event Winchester's Toledo caught Hawkins' White in 6½ miles. In the second heat the Franklin caught Frank Garbutt's White in 2 miles. In the final the Toledo won in 6 miles, overtaking the Franklin at that distance.

The next race, a 5 mile, was also won by the Toledo in 5:58 1-5. Hawkins' White was second and the "Coyote" third.

In the sixth race Ryus' White ran much better and led Barney Oldfield for 3 miles. It looked as if something was the matter with Oldfield's machine, but he came through strong in the finish, winning handsily in 5:44½.

The seventh event was a special 5 mile race for Winton touring cars. Three machines started, driven by Turner, Ives and Herrick respectively. Turner retired after the first mile. Ives won in 10:02, and Herrick finished second, a half mile in the rear.

The last race of the day, the 10 mile free for all, was by far the most interesting. Oldfield entered both of his machines, Chapman driving the Baby Bullet and Barney handling the wheel in No. 2. The latter trailed along close behind the Baby Bullet for 7 miles, and then, in the eighth mile, opened up in earnest. The ninth mile was caught at fifty-eight seconds, and Oldfield started out after a new record for the tenth. When he struck the head of the stretch he saw the Toledo and Tourist pounding away down the line, and as the race was already safely won he jammed on the brake and slowed down to the wire. Even at that the watches caught the time at 57s. flat. Oldfield's time for the 10 miles was 10:33.

Ryus also did some remarkable work with Hawkins' White car. This machine was entered in the 10 mile race, and though outclassed by both of Oldfield's racers, succeeded in breaking the world's record for cars of its class. The best mile the White made was one in 1:06, and the time for the 10 miles was 11:20, lowering the world's record by almost half a minute.

Oldfield made a try for the 15 mile record in the Bullet No. 3, in which he established the present world's record at Denver in October. The new crank shaft did not run as free as he had expected and he fell short of making any new figures for the distance, going it in 15:44 4-5.

Imprisoned for the Health of Public Roads.

In a district in France, where the authorities are very severe with motorists, a physician has been sentenced to imprisonment for exceeding the speed limit with his car. Accordingly he put a notice in the local journal to the following effect: "Dr. A—F— will be absent from Wednesday to Friday inclusive, as he has been prescribed three days of imprisonment for the alleged benefit of the health of the public roads."

Steam Boilers.

(Abstract from a Lecture by Parker H. Kemple before the Boston Y. M. C. A. Auto School.)

In the design of steam boilers there are certain requirements that must be constantly kept in mind. One is that the heat must pass from the flame to the water as readily as possible, which calls for a thin metal wall of great conductivity. On the other hand, safety requires thickness of metal and strength.

On applying heat to water the parts heated expand and, growing lighter than the surrounding water, rise to the top, their place being taken by the colder, heavier water. This condition calls for plenty of room for the water to circulate. On the other hand, in order to heat the water quickly it must be spread in thin sheets over as much surface as possible. This requires that the heat shall be passed through a large number of small tubes, as in the fire tube boiler, or else that the water shall be passed through a number of small tubes, as in the water tube boiler. In either case the circulation is restricted.

FIRE TUBE BOILERS.

This type of boiler consists essentially of a cylindrical shell closed at both ends by heads or tube plates, and of numerous tubes of from three-eighths to five-eighths inch diameter (automobile boilers), running through it from end to end, through which the flame and hot gases pass on their way to the chimney. The heads and shell in the simpler forms of boiler are made of steel on account of the strength of this metal. The tubes are usually made of copper, as this metal passes the heat from the fire to the water more readily, and while not as strong as steel is still amply strong for pressures of 150 to 250 pounds. Above this the loss of strength of copper at high temperatures renders steel more advisable.

In another form of construction much used in light cars the shell is made of seamless copper pipe, about .05 of an inch thick, and is wound with several layers of steel piano wire. This results in a great saving in weight, as good steel wire has a breaking strength exceeding 100,000 pounds per square inch, as against about 62,000 pounds for steel boiler plates.

Where this construction is used the ends of the copper shell are flanged or bent out and the head is laid on; then a steel ring is placed on the head, another under the flange and rivets are passed through all four thicknesses, so that the joint between the head and flange is firmly clamped between the two steel rings. Where a steel shell is used it varies from three-sixteenths to five-sixteenths of an inch in thickness, according to the size of the boilers and the pressure required. It should not be forgotten that there is a continual corrosion on the inside of the boiler, and from a thirty-second to a sixteenth of an inch should be added to the thickness required to allow for this corrosion.

A factor of safety of at least four should

be used; that is, if the plate comes stamped 60,000 pounds tensile strength, a maximum of 15,000 pounds should be used in the calculation and 12,000 pounds would be better. In this matter of strength of shell it should be remembered that a riveted joint can never be as strong as the plate.

As the diameter of a tube decreases, the thickness remaining the same, the ability to withstand pressure from the inside increases. In other words, as we decrease the diameter of a tube, the pressure remaining the same, we can decrease the thickness and weight of the tube and still retain the same strength. This leads us to a consideration of the water tube boiler which exists in innumerable variations of form, but with the same general principle underlying them all; namely, that the greater part, if not all, of the heating surface consists of relatively small tubes containing the water. Two of the most important requirements in boiler design are here fully satisfied—maximum strength with minimum weight and division of the water contained into relatively small bodies in contact with a proportionately large area of heating surface.

In the fire tube boiler the comparatively large amount of water contained gives a greater steadiness of steaming than is obtainable with any other form under average conditions. The large amount of heat stored in the water acts as a flywheel in storing up or giving out energy according to the varying demands due to road conditions. There is more leeway in tending to the water level, as a variation of 6 inches in the gauge is permissible. On the other hand, if the water gets too low, unless the fusible plug acts exactly on time, it is quite probable that the boiler will need to see a repair shop.

WATER TUBE BOILERS.

The water tube boiler carries much less water, and while it makes steam quicker and stands forcing better, it requires a more steady water level to be maintained, as the small amount of water contained will be used in a shorter time.

Perhaps the greatest advantage of both the water tube and flash boilers is that the steam pressure is practically unlimited. Pressures of 1,000 pounds are in use experimentally today, and with engines of the turbine type, where cylinder lubrication is not a factor, there is no bar to higher pressures should the increase in economy warrant the extra cost of material. The power of these small boilers varies almost as the effective heating surface. In the fire tube boiler the heating surface is that of the tubes and one-half the lower head—the upper head and shell being of no account. One-half of the lower head only is taken, as the tubes in these small boilers cut out the other half. In this type of boiler 8 square feet of heating surface should give 1 horse power and under especially favorable conditions slightly more. In the water tube type the steaming capacity is greater, and $3\frac{1}{2}$ square feet

of well placed coil should give one horse power.

Water tube boilers can be divided into two classes, those with natural and those with forced circulation. By "forced" is meant that some external means, such as a feed pump, is used.

In order to have natural circulation the path of the water must be reasonably free from sharp bends, reverse curves and downward bends after passing through the flame; otherwise on forcing the fire steam will form in these bends and drive the water in both directions, interrupting the circulation, and if occurring where the heat is the greatest, may lead to burnt out coils. Even if no damage to the boiler results, the generation of steam will be irregular, and there is nothing more annoying than seeing the steam gauge pointer jumping 50 pounds up and then dropping back again.

For natural circulation, unless the tubes are so designed that the bubbles of steam will mechanically increase the velocity of the water, the tubes should not be over thirty-five calibres in length.

Where artificial circulation is used the designer has more freedom. He can reverse the circulation and bend his pipes as he wishes, bearing in mind, of course, that the more bends the more work for the pump and the less available power for propelling the car. If the length of pipe be sufficient, all the water will be vaporized and nothing but steam will issue from it, and the water tube boiler will have become a flash boiler. Somewhere between these two types unquestionably lies the boiler of the future. More of a water tube for marine and stationary work and more of the flash type for motor cars. In the water tube boiler the water level still requires watching to insure steadiness of steaming, although most of the boilers would not suffer greatly were they emptied for a short time. When we come to the flash or to the semi-flash boiler, the water glass disappears and its place is taken by two automatic regulators. One of these cuts off the fire when the temperature of the steam reaches a certain point; the other regulates the water supply and is governed by steam pressure.

FLASH BOILERS.

If the water gets low or gives out entirely, the whole boiler gets hotter and hotter until the temperature reaches the point for which the thermostat or fire regulator is set, when the latter cuts down the fire and saves the boiler from burning out.

The water regulator varies the amount of water according to the steam pressure and the two work together beautifully. For example: A car fitted with a flash boiler and the above described regulator is running along with everything balanced, and comes to a down grade. Steam is shut off by the driver and, of course, the pressure rises. As soon as it reaches a predetermined point the water regulator cuts off the water supply from the boiler and lets the pump discharge back into the tank. Meanwhile the steam pressure is still rising and with it

the temperature, until the boiler is nearly or entirely empty and the thermostat cuts off the main burner, leaving the pilot light to keep things warm. At the foot of the hill the driver turns on steam; with the drop in pressure resulting the water regulator opens, and as soon as the water enters the boiler the temperature of the latter drops, the thermostat turns on the main burner again and things are as they were before the hill was encountered.

A WORD ON SUPERHEATING.

Steam as it arises from water contains a certain amount of water in suspension, which is detrimental to the efficiency of the engine. If we add enough heat to this steam we can vaporize that water and bring the steam nearer to being a perfect gas.

Gauge glasses are an unmitigated nuisance. They break when they ought not to; they get stopped up and let the boiler burn out when you trust them too long, and they keep you busy watching them when you had rather be watching the scenery or your companion. They should be connected to the boiler by short straight pipes, the lower at the bottom of the boiler and the upper at the top. It is essential that they have separate pipes of their own in order to register correctly. They should be cleaned or blown through regularly, to make sure that the pipes are all clear. A frequent cause of trouble is found in the rubber washer that packs either end of the glass, not being in square and swelling under the influence of the hot water, thus stopping up the lower end of the glass. There should always be some independent way of testing the level of the water, such as cocks on the water column. Personally I invariably take out the gauge checks, as they are liable to stick and cause trouble.

Safety valves should be adjusted at the factory and afterward left alone. They should be connected to the top of the boiler, but had better be placed below everything, where they do no damage when they blow.

Feed valves need cleaning every little while and care should be taken to see that the movable part and seat have not worn out of shape. The usual amount of lift is about 3-64 inch. The steam gauge must be so connected to the boiler that there is always a cushion of water between the steam and the gauge.

An English customer recently bought a car in Paris. The car needing some repairs, he shipped it to France, and discovered that a new customs regulation demands the payment in such a case of full duty and no return subsequently of the sum paid. The object of the Government is to prevent the return of the home made machines for sale at reduced prices. The only cars allowed in free of duty are cars sent from France on consignment and returned unsold. The concession that duty already paid shall be returned within a specified time applies only to the cars of bona fide tourists.

OUR FOREIGN EXCHANGES.



Users of motor trucks and delivery wagons in Great Britain are organizing the Motor Van and Wagon Users' Association, to become a section of the Motor Union.

A recent alleged improvement in connection with storage cells for ignition purposes is to mount the tray or box containing the cells on special springs in the vehicle body, to protect the cells from shock.

The sport committee of the Automobile Club of France at its last meeting decided to take under consideration the project of a Paris-St Petersburg "excursion." The sport committee and the touring committee together will elaborate regulations for this "excursion."

Perhaps the oldest public automobile service in actual operation is that of the Speyerer "Motorwagen Gesellschaft," of Speyer, Germany. This company has now operated five Daimler gasoline motor omnibuses continuously for four years, and has also carried the mails between the towns connected.

On the initiative of the *Stampa Sportiva*, an appeal is being circulated among Italian automobilists for the formation of a corps of automobile volunteers who would place their services at the disposal of the Ministry of War for active service in time of war and for peace service in connection with the army manoeuvres.

According to a contemporary the Russian Minister of Posts and Telegraphs is having built at a Russian works twenty-four motor vehicles, ten being heavy trucks intended for transporting parcels to the railway stations, and the other fourteen light cars of 8 to 10 horse power for distributing the mails in the suburbs of St. Petersburg.

A motor mail wagon has again been placed in service, experimentally, by the Berlin post office. The vehicle, which attains a maximum speed of 11.5 miles per hour, will be under tests for six months, including three winter months, and if the tests prove satisfactory the postal administration of Berlin will definitely adopt motor mail wagons.

The following awards have been made in the recent French trials for city and suburban vehicles: De Dion-Bouton coupé, gold medal; fore carriage "Hippo-Mécanique," silver medal; Gillet-Forrest delivery wagon, gold medal; Aries delivery wagon, silver gilt medal; De Dietrich omnibus, gold medal; De Dion-Bouton delivery

wagon, gold medal; De Dion-Bouton truck, silver medal.

The Prince of Wales has by royal warrant appointed the Daimler Motor Company, Limited, his motor car manufacturers. The Daimler Company has for some years held from the King the appointment for motor cars.

The A. C. G. B. I. is communicating with the Junior Institution of Engineers with the object of securing from among the members of the institution a supply of competent observers for the commercial vehicle trials to be held next year.

The latest thing in face protectors for automobilists to be brought out in Paris is said to be a face shield or mask of transparent horn, provided with glasses as usual. The horn has an advantage over celluloid, formerly used, in that it is not inflammable.

The technical committee of the A. C. F. at its last meeting passed the following resolution: "The technical committee considers that basing the classification in competitions solely on cylinder volume involves the risk of diverting automobile construction into a direction dangerous for its future, as it would encourage the construction of motors of unreasonably high speed."

Following the suggestion made at the recent dinner of the British Society of Motor Manufacturers and Traders, a formal communication has been made to the A. C. G. B. I. by the society, asking that, in the course of next year, trials may be organized by the club with special reference to brake horse power on road wheels, ignition apparatus, mufflers, carburetors and general motor efficiency.

Baras, with a four cylinder Darracq machine, succeeded in lowering the kilometre record for the light car class on the road from Montgeron to Lieusaint on November 13, timed by MM. Taupier and Gaudichard, official timekeepers to the Automobile Club de France. He covered a flying kilometre in 29.2-5s., equal to 76.04 miles an hour. The previous record was held by Thiéry, whose time was 30s.

Under the amended British motor car act, which will be in force on January 1 next, every motor cyclist will have to pay for the Inland Revenue license 15s. He will then require to have his motor cycle registered with the county council or county borough council. The council will then assign to each motor cycle a separate number, the registration fee for which will be 5s. He will then require the owner's license to drive the motor cycle, which will be 5s., and a proof will have to be submitted respecting the applicant's age, which must be over fourteen years. Total cost, £1 5s.

MINOR MENTION.



Edward A. Browne has opened a garage at 413 Main street, Paterson, N. J.

The Graham-Fox Company have just completed a new 35 horse power model.

The Hillier Institute of the Y. M. C. A., Hartford, Conn., is contemplating an auto class.

A committee has been appointed to report on the organization of an automobile club at Dallas, Tex.

The E. W. Bliss Company, Brooklyn, N. Y., are building a number of experimental gasoline cars.

A final dividend of .012 has been declared in the bankruptcy of the Steam Vehicle Company of America, Reading, Pa.

The Ohio Savings Bank and Trust Company has been appointed receiver of the Toledo Motor Carriage Company, Toledo, Ohio.

The Western Automobile Company are erecting a fine new garage at 218 to 222 Walton avenue, St. Louis, Mo. Samuel Bredon is manager.

It is reported that the Adams Company, Dubuque, Ia., will embark in the manufacture of gasoline automobiles on quite an extensive scale.

The Whiting Foundry Equipment Company, Harvey, Ill., are building a 5 ton gasoline truck propelled by a 30 horse power four cylinder motor.

Wootton & Brew will open a garage accommodating about fifty cars in New York. They have secured the agency for the Thomas and Stevens-Duryea.

McCord & Co., 1470 Old Colony Building, Chicago, Ill., have leased the business of the John McCanna Company, manufacturers of multiple oilers, and will push it energetically.

The Pleasanton Iron Works has been incorporated at Pleasanton, near Oakland, Cal., with \$200,000 capital, to build automobiles. Wickliff Matthews, of San Francisco, is said to be manager.

On Monday at 3 p. m. an official test of the Jones Speedometer was made at Riverside Drive and 106th street, New York city, by the Police Department, which is considering the adoption of this device for the bicycle squad.

The new Corbin air cooled car is being thoroughly tested at the factory, New Britain, Conn., and with satisfactory results. The car will sell at \$1,750 and will be propelled by a two cylinder, vertical, air cooled engine, transmitting power by means of chains.

The A. L. Dyke Automobile Supply Company, St. Louis, Mo., have taken steps to increase their capital from \$10,000 to \$25,000, fully paid, and will enlarge their business, putting several salesmen on the road and moving to larger quarters. F. H.

Britton, Roy F. Britton and Charles Peters have become directors.

A C. Banker, Chicago, has secured the agency for the Autocar in that city.

An automobile mail service covering all the towns between Nashville and Chapel Hill, Tenn., is being agitated.

The Motor Car Company of New Jersey, Newark, N. J., are building a fine new garage at 201 and 293 Halsey street.

McIlvrid & Groeschel, 12 Park street, Jersey City, have secured the local agency for the Packard and U. S. Long Distance cars.

Hollander & Tangeman, American agents for the F. I. A. T. Italian cars, have opened a salesroom at 5 West Forty-fifth street, New York.

The Jaynes Automobile Company, Buffalo, N. Y., will erect a new garage building at 883 to 887 Main street, to be ready for occupancy next spring.

The Automobile Company of New Jersey, Newark, has been sold out by the sheriff, and is succeeded by the Central Automobile Company, 224 Halsey street, under the management of J. E. Crater.

The U. S. Long Distance Automobile Company, Jersey City, N. J., will manufacture next season only one car, a four cylinder vertical 20 horse power machine, fitted with any style of body desired.

Creditors of the Searchmont Automobile Company, at a meeting on November 23, passed a resolution recommending that the company be granted an extension of two years, and that the plant be operated during that period.

Three additional licenses to importers of foreign automobiles have been granted by the A. L. A. M., as follows: Alexander Fischer, the Sidney B. Bowman Automobile Company, and the Auto Import Company, all of New York city.

L. J. Sackett, formerly with the Searchmont Automobile Company, has accepted a position with the Peerless Motor Car Company, and is now representing that company in the most important Southern cities.

The exports of automobiles and parts from the United States during the month of October were valued at \$110,331, as compared with \$122,624 for the same month last year. The exports for the ten months ending with October, 1903, amounted to \$1,311,960, as compared with \$709,610 for the same period in 1902 and \$262,537 for the same period in 1901.

At the annual meeting of the Boston Automobile Dealers' Association, held last week, the following officers were elected: President, Kenneth A. Skinner; vice president, W. E. Eldridge; treasurer, A. P. Underhill; secretary, Chester I. Campbell. On the recommendation of the show committee Chester I. Campbell was appointed manager of the March show in Symphony Hall. The Peerless Motor Car Company, Crest Manufacturing Company and Thomas B. Jeffrey Company were elected to membership, and a committee was appointed to con-

sider trade abuses, principal among which is the curbstone broker.

It is reported that the United States Express Company will establish a complete automobile service in Columbus, Ohio.

Club Notes.

DAVENPORT A. C.

The annual dues of the Davenport Automobile Club have been fixed at \$25.

MONMOUTH A. C.

The Monmouth Automobile Club, of Monmouth, N. J., is backing the project of constructing a stone road between Matetan and Red Bank, a distance of 13 miles. If built it would not only make a continuous stone road between that place and New York, but reduce the distance by about 30 miles.

AUGUSTA A. C.

The Augusta (Ga.) Automobile Club has permanently organized as follows: President, Dr. W. C. Lyle; first vice president, George R. Lombard; second vice president, D. F. Jacks; secretary and treasurer, William Martin. The following committees were named: On membership—Dr. J. B. Wright, H. C. Boardman and Dr. E. E. Murphy. On exhibitions, tours and runs—George S. Lombard, C. G. Kelly and Louis Evans. On laws and ordinances—R. J. Edenfield, W. H. Doughty, Jr., and W. T. Field. On good roads—George S. Murphy, Henry Pund and H. C. Hall. On house—William Martin, Clark Jacks and Frank Bohler.

N. Y. S. A. A.

At the first meeting of the board of directors of the New York State Automobile Association, held at Syracuse, on November 28, Judge William H. Hotchkiss, president of the Automobile Club of Buffalo, was elected president of the association; Charles M. Page, secretary of the Albany Automobile Club, vice president, and Frederick H. Elliott, secretary of the Automobile Club of Syracuse, secretary-treasurer. President Hotchkiss, chairman; W. G. Miles, of the A. C. A.; H. W. Smith, of Syracuse, and W. J. Youngs, of the Long Island Automobile Club, Brooklyn, were elected as a legislative committee, with one vacancy to be filled later; Emerson Brooks, chairman, and the respective chairman of the same committee of each club members of the association as a good roads committee, and A. J. Baechle, of Utica, chairman of the membership committee. The constitution and bylaws were unanimously adopted, incorporation papers were approved and it was decided to establish State headquarters in Syracuse. Six of the eight clubs which are members of the association were present, as follows: Judge William H. Hotchkiss, Buffalo; H. A. Baechle, Utica; Charles M. Page, Albany; A. R. Pardington, Brooklyn; Emerson Brooks, New York, and Frederick H. Elliott, Syracuse, and also C. H. Gillette, secretary of the A. A. A.



The right of owners to use duplicate numbers on their automobiles will be tested by the Chicago police.

The number of auto licenses granted to date by the Massachusetts Highway Commission is 3,851, of which 497 are motorcycles.

John Nadig was recently fined \$75 and costs by Judge Yerkes, of Doylestown, Pa., for having driven his machine faster than the speed allowed by the State law.

The 40 per cent. increase in the value of a Panhard automobile imported by Daniel J. Sully, of New York, which was imposed by the Appraiser and sustained on appeal by the United States General Board of Appraisers, is understood to have been paid by the importer.

E. M. Friend, a New York lawyer, is agitating the question of making the reckless driving of motor vehicles at a speed faster than the law allows punishable as a felony, and is now engaged in collecting statistics bearing upon the number of persons injured or killed by automobiles during the last three years with the object of presenting them as a reason for the passage of such a bill by the next Legislature.

Mrs. Sydney L. Heidelbaugh, of Fairville, Pa., has brought suit for \$30,000 against Alfred I. Du Pont for injuries sustained by her horse being frightened by defendant's automobile. Plaintiff's attorney sets up the novel contention that the law regulating traction engines on highways also applies to automobiles, and that Mr. Du Pont should have sent a man ahead to warn Mrs. Heidelbaugh of the approach of his automobile.

Winthrop E. Searritt, the new president of the A. C. A., states that he will strive to have the Bailey automobile law amended so that it will be more fair to automobilists. He is quoted as being in favor of replacing the provision as to passing animals at 8 miles an hour with one requiring the slowing down to that speed when passing animals which show fright and are attached to vehicles; of erecting proper signboards on the roads; and of a campaign in favor of good roads and the Brownlow bill.

It is stated that the Pittsburg Reduction Company, against which the United States Court of Appeals in New York recently rendered a decision in favor of the Cowles Electric Smelting and Aluminum Company, of Cleveland, for infringements of patents since 1892, has made a compromise settlement by the payment of a large sum of money, covering the damages of infringement for ten years, and royalties for the manufacture of pure aluminum under a special license granted by the Cowles Company.



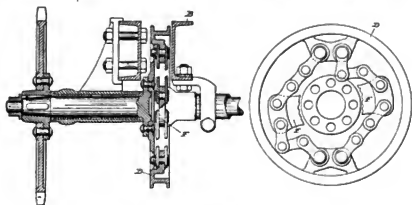
United States Patents.

744,775. Frame for Motor Cars.—John J. MacMulkin, of Long Island City, N. Y. November 24, 1903. Filed July 10, 1903.

In order to prevent racking and throwing out of alignment of the frame the motor,

peding or disturbing the driving of the wheels.

It will be readily seen that should a motor car constructed as described sink or raise one of its rear driving wheels a distance for which the springs could not or did not compensate it would only be the yielding frame which would be temporarily thrown out of position. One corner of the yielding frame would rise (the side bars turning therewith if pivoted or the channel iron bending if bolted), lifting the pivots on one side and lowering the pivot on the



No. 744,775.

its shafting and the transmission gear rigidly coupled thereto are mounted in a rigid braced frame, and to this frame are secured a pair of the vehicle wheels, thus giving two forward points of support to the frame. A second frame is mounted on the other two wheels, and this second frame is yielding to a limited extent, and between the two frames is a flexible coupling in the transmission gear.

The flexible coupling is composed of the recessed disks D, each of which has its rim flanged and grooved, so as to accommodate a brake strap. Within the disk D an elongated plate F, keyed to the end of the driving shaft, rotates in the same plane as a pair of lugs on the disk. The plate F and the lugs are connected with each other through short linked chains. It will be obvious that owing to this chain link connection the plate F and disk D may thus change their relative positions vertically without in any way im-

other side. This would raise the centre pin with relation to its former position; but the rigidity of the braced forward frame would in no way be disturbed.

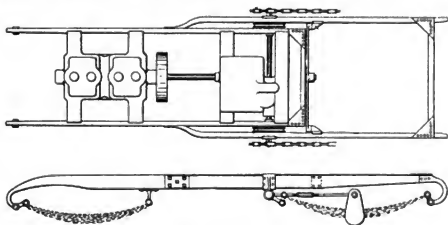
744,972. Brake.—John H. Pick, Stamford, England.. November 24, 1903. Filed February 7, 1903.

744,822. Kerosene Oil Engine.—William W. Tuck, Richmond Hill; Abbot A. Low, Horseshoe, and August Wassmann, Astoria, N. Y. November 24, 1903. Filed December 16, 1902.

744,895. Storage Battery Plate.—Joseph Bijur, New York, N. Y. November 24, 1903. Filed August 14, 1900.

744,986. Governor for Dynamos.—Tracy S. Tague, Pendleton, Ind. November 24, 1903. Filed December 18, 1902.

745,266. Gas Engine.—Charles W. Tremain, Chicago, Ill., assignor of one-half to Frank E. Tremain, Chicago, Ill. November 24, 1903. Filed August 30, 1901.



No. 744,775.

GOOD RULES

To Observe in Laying Up Automobiles for Winter.

If the devil finds mischief for idle hands to do, the devil could not find anything worse than rust for idle automobiles, and Science and Practice have never found a better preventative for rust than Dixon's Graphite.

Chains should be removed and dipped in Dixon's Graphite Compound heated to about 180°.

All threaded joints should be treated with Dixon's Graphite Pipe Joint Mixture.

All small working parts should be smeared with Dixon's Graphite.

And pistons and walls of cylinders should have Dixon's No. 635 Graphite thoroughly rubbed into their pores.

If all this is done, so far as rust is concerned, the machine will be as good as new in the Spring, ready to run or sell.

SEND FOR BOOKLET 56 C.

JOSEPH DIXON CRUCIBLE CO.
JERSEY CITY, N. J.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to
Motor
Interests

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Next Year's Output.

Many of the manufacturers have already given their orders for parts for the 1904 season, and it is thus possible to make a fairly accurate estimate of the projected output of autos next year. It is probable that the total output will be nearly double that of 1903. Manager George H. Day, of the Licensed Association, estimates the probable total production at over 25,000 vehicles. The Olds Motor Works' output will undoubtedly be the largest, but we are unable to give a close estimate of its volume; between 6,000 and 7,000 is probably a conservative figure. The Cadillac Company's projected output comes next, with 4,000 machines; then follow Ford, 3,000; Jeffery, 3,000; Winton, 2,000; Knox, 1,500; Autocar, 1,500; Stanley, 1,200; Crest, 1,000; White, 1,000; Pope, 1,000; Peerless, 500; Packard, 500; Pierce, 500; Haynes-Apperson, 500.

The estimated production of these fifteen largest manufacturers is therefore over 27,000. It will be noticed that many large manufacturers, like the Locomobile Company, Electric Vehicle Company, J. Stevens Arms and Tool Company, are not comprised in the list. There are in all nearly 100 builders or manufacturers of complete vehicles in this country, and quite a number of those not enumerated will produce over 100 vehicles each. It will thus be seen that the total projected output easily reaches the figure of 35,000, which was given by Mr. Scarritt last winter as the probable output this year. In many cases, no doubt, the actual production will fall behind the estimate, but Mr. Day's estimate appears very conservative in view of the above quoted figures.

There is no immediate danger of overproduction in the runabout line, as the field for these vehicles is capable of almost indefinite extension; besides, the exports of American machines consist largely of runabouts. There is, however, some danger

of overproduction in touring cars, particularly those of the larger and more expensive type. Every year some manufacturers change over from the runabout or light car class to the heavier touring car class, and competition in this line has been steadily increasing. Fortunately many of the wealthier class make it a rule to have a new car every season, but otherwise there is less opportunity for extending the markets of these vehicles than those of light weight machines. The class who can afford to own a luxurious touring car is naturally limited, and the greater number of this class had their interest in automobiles aroused at an early date. Overproduction in this branch of the trade should be cautiously guarded against, as it is bound to result in great losses to manufacturers and a general demoralization of the business.

Technical Trials.

At the recent meeting of the British Society of Motor Manufacturers and Traders a number of the speakers spoke in favor of so conducting future trials as to secure experimental data valuable to engineers, and subsequently a resolution was passed by the society requesting the Automobile Club to organize trials with this end in view. The English trials have always borne the stamp of a practical character, but so far the chief aim has been to determine the capabilities of the different machines and furnish valuable information to users, besides impressing the general public with the practical character of automobiles. Now, however, the general public is fully aware of the practical service a motor car may render, and further demonstrations along these lines would be of little value in comparison with the expense they occasion to manufacturers. The number of entries has also grown so large that the judges are not able to devote the requisite time to each car in their examination after the trials. The reliability and durability of the cars have so

much improved in recent years that a large proportion make nearly perfect records, debited only with short stops during the trials for minor adjustments or easily corrected mishaps.

On the other hand, technical data for the guidance of designers are still comparatively scarce. Little definite data has yet been published and designers must be guided mainly by their own individual experiences, which in most cases must necessarily be limited.

The Automobile Club of France early recognized the value to the industry of special technical investigations and maintains a testing laboratory at which a number of trials have been carried out on a scientific basis. The range of work open for such a laboratory is very large. Competitions for carburetors, mufflers, igniters, ignition batteries, etc., would all tend to stimulate improvement, and through the publication of the results in connection with detailed descriptions of the apparatus would furnish much valuable information to designers. Besides, the advertising value of competitions would not be lost here. Success in a contest becomes fully effective commercially only through publication, and as the results of practical trials and competitions would be published almost as widely in papers reaching persons interested in automobiles as those of contests of a purely demonstrative character, the successful competitor would profit practically quite as much.

Plante versus Faure Batteries for Electric Vehicles.

In his lecture on storage batteries before the Automobile Club of America Mr. Lyndon made the unqualified statement that Plante batteries are not suitable for motor car work. "Although this opinion has frequently been expressed abroad, we believe this was the first time in this country it was voiced in public by an accredited expert. Prior to the expiration of the Brush patent last winter, there were at least three American manufacturers who made Plante batteries for automobiles. Though they generally conceded that it was impossible to obtain the same output from a given weight with their type of battery as with a Faure battery, they maintained that the longer life of the Plante battery fully made up for its deficiency in the matter of specific capacity. Now this latter notion seems to have been exploded. The necessity for reducing the ratio of car weight to passenger weight, in

order to make electric vehicles more economical, has gradually become more firmly impressed upon manufacturers, and is the main reason why Plante batteries are being abandoned in favor of the pasted types. Since the expiration of the Brush patent one manufacturer who temporarily manufactured Plante batteries has returned to the pasted type, and one other, who was restrained by injunction from marketing his product, has resumed business. We learn that one of the large manufacturers of Plante type batteries who heretofore supplied a large proportion of the batteries of this type used on motor cars has decided to confine himself to batteries for stationary work in the future.

More Opposition on Aesthetic Grounds.

Hardly has the protest of Sir William Richmond against the "hideousness" of automobiles died away when another member of the Royal Academy raises his voice against the supersession of the horse in the streets of London by motors, or what he calls traction engines. Briton Riviere, R. A., in a letter to the London *Times*, enumerates many alleged objections to "traction trams," which he says are multiplying in London, and profoundly deplores the gradual expulsion of the horse. Says Mr. Riviere: "These beautiful creatures—for they are all beautiful in their own way, whether they belong to dray or carriage, cab or omnibus—bring us daily face to face with one of the most lovely of living forms—so lovely, indeed, that nature in its wildest and most inaccessible ranges can hardly surpass it. We are so accustomed to rub up against this high type of animal life that we do not know its value, or how much our sum total of visible and tangible beauty would be diminished were this to be taken from among us."

These sudden bursts of aesthetic indignation in England certainly come as a surprise, for the English people have been proverbially noted rather for their appreciation of the material things of life than for acute æsthetic sense. Perhaps it is this very national trait which explains these outbursts on the part of would be reformers.

Mr. Riviere's protest comes rather late, for the supersession of the horse by the mechanical motor has already progressed very far, thousands of street car horses having been dispensed with in all the large cities since the advent of the trolley system. The passing of the street car horse may have been less keenly felt by artists of Mr.

Riviere's stamp, for the average street car horse is hardly an æsthetic object.

The letter further intimates that the introduction of mechanical traction is an advantage only to a few tradesmen and contractors "who are serving nobody but themselves and their customers."

The *Times*, in commenting upon Mr. Riviere's remarks, rightly observes that the question of ugliness could not be pleaded successfully before a council and jury; it reiterates that it has no objection to motor cars, but seems to agree with Mr. Riviere that the only persons to profit from the substitution of motor traffic for animal traffic are those in whose direct interest the traffic is conducted. It seems to have been entirely forgotten that the general public have other interests than those of an æsthetic nature. It is certainly more important for the public to live in healthful surroundings than to live in æsthetic surroundings, and the sanitary conditions of the large cities will be greatly improved by the substitution of animal traction for horse traction. Besides, those who really love the horse cannot fail to be pained by seeing the sufferings which he is frequently subjected to, particularly in winter when the streets are slippery, and should be glad to see him freed from his burdens. On the whole, however, progress in traction will be regulated by practical considerations, and not by the whims of idealists.

The Hackensack Meadows Highway.

The work of building an improved highway across the Hackensack Meadows, to connect the wealthy residential towns of Northern New Jersey with the cities on the Hudson River opposite Manhattan, which is referred to in an article in another part of this issue, is of more than passing interest to metropolitan automobilists. To them it will open a large territory of great scenic beauty, provided with well built roads which offer splendid opportunities for tours of easy distance. This territory is now with difficulty accessible. The trip through the lower portion of the city on a week day, and the circuitous route by way of Staten Island are regarded with as much aversion as the trip over the sandy roads of the meadows, the other alternative of reaching the highlands of Northern New Jersey. The road will naturally be of the greatest value to automobilists of the Oranges, Montclair and other towns in that vicinity, as it will give them much better access to New York city and the fine high-

ways leading out of it to the north, as well as those on Long Island; but it will also be a great blessing to the automobilists of New York and vicinity, as it will add to the number of interesting short trips which can be taken from the city. In automobilism, as in everything else, variety is the spice of life, and the most charming route at last grows monotonous. The addition of Northern New Jersey to the touring grounds readily accessible from New York city is the more desirable for the reason that the scenic attractions of this section are of an entirely different character from those met with in other directions out of the city.

Co-operative Garage for Havana.

American automobilists who wish to spend a portion of the winter in Cuba will be interested to learn that a large new garage has just been established in Havana, 28 Zulueta, by the Havana Garage Company, of which Dr. D. T. Lainé is the promoter. The company is a co-operative concern, with a capital of \$10,000, organized by the majority of the owners of cars in Havana for their own convenience and protection. There are at present thirty-eight automobiles in Havana, owned by twenty-six enthusiasts, and of these seventeen have joined the new enterprise. Reading rooms of the Automobile Club will be established in the same building, and it will be made a meeting place for tourists who bring their cars with them. Considerable machinery for repairing and cleaning machines has already been put in, and more extensive arrangements are under foot.

The members of the Automobile Club of Havana expect many American tourists in Cuba this winter. They can bring their cars into the country without paying any duty for the period of three months, and at the end of that time can secure an extension for a similar period. The roads in the neighborhood of Havana are said to be unexcelled for automobile running, and more beautiful scenery cannot be found. There is a splendid road, 175 kilometres long, which runs among delightful vistas, and many short trips can be made to side villages and points of interest.

Any owner can become a member of the association by buying one or more shares of stock at \$100 a share. It is the intention of the garage company to later furnish cars to the public at so much a day or month, thus helping to make the sport more popular.

A reader informs us that the Standard Oil Company have an oil which they recommend for cooling purposes, a liquid of over 220° flash test and a very low freezing temperature. He considers the solutions unsatisfactory.

Hydrometers and Their Use in Connection With Automobiles.

The hydrometer is an instrument for determining the density of liquids, and is used by automobilists for testing gasoline, storage battery electrolyte and non-freezing solution. To be able to express the density of a liquid in definite terms it is necessary to have a standard density, and for this is taken the density of distilled water at 60° Fahr. Water under these conditions is said to be of unit specific gravity (the terms "density" and "specific gravity" are here used interchangeably). The specific gravity of other liquids may then be determined in the following manner: Weigh off 1,000 grains of distilled water at 60° Fahr.; then take an equal bulk of the liquid the specific gravity of which is to be determined and weigh it; its weight in grains divided by 1,000 will be its specific gravity. For instance, chemically pure sulphuric acid equal in bulk to 1,000 grains of water weighs 1,845 grains; hence, the specific gravity of sulphuric acid is 1.845.

It is, however, not very convenient to accurately measure and weigh a quantity of the liquid the specific gravity of which is to be determined, and the same object is accomplished much more readily by means of a hydrometer. This instrument is based on the law of floating bodies—that such bodies will displace a volume of the liquid in which they float equal to their own weight. If the liquid tested is of low density or low specific gravity a greater bulk of it is required to equal the weight of the floating body, and the latter therefore sinks deeper into the liquid, so as to displace more of it. On the contrary, if the liquid tested is of high specific gravity a smaller bulk of it is equal to the weight of the floating body and the latter sinks into it less deeply. Hence the depth to which a floating body sinks into a liquid is an indication of the density of that liquid.

The hydrometer consists of a glass tube, with a bulb at one end and a stem of small diameter at the other. The bulb is filled with lead shot, in order to make it heavy and cause the tube to float with the stem pointing straight upward. Upon the stem are inscribed division marks from which the density can be read off directly, in terms of one of a large number of different scales. The only two scales which interest the automobilist are the so called specific gravity scale and the Baumé scale.

HYDROMETER SCALES.

The zero point for the specific gravity scale is found by placing the instrument in distilled water at 60° Fahr., and making a mark on the stem where it emerges from the liquid. Other points on the scale can be determined by preparing liquids of different densities—salt solution, for instance—determining their specific gravity by weighing and measuring as described above, placing the instrument in these liquids and marking the specific gravity of

each liquid on the stem where it emerges from that liquid.

Some of the liquids which require to be tested as to their density are lighter than water, while others are heavier. Petroleum and all its products, alcohol, benzine, etc., are all lighter than water. Salt solutions, acids, etc., are heavier than water. In the United States the specific gravity scale is largely used for expressing the density of liquids heavier than water; it is used exclusively for testing the density of storage battery electrolyte. This scale is certainly the easiest to understand for the layman. The objection made to it and the excuse for the many other scales are that the use of four figures in expressing a density is confusing and annoying.

THE BAUMÉ SCALES.

There are two entirely different Baumé scales, one being used for testing liquids heavier than water, and the other for liquids lighter than water. These scales are due to Antoine Baumé, a French chemist, and were originated in 1768. The Baumé scale for liquids heavier than water is only rarely used. It was obtained as follows: The zero point was first determined by immersing the instrument in distilled water at 60° Fahr. Then a solution of sodium chloride (common salt) was made containing 15 per cent. of salt and 85 per cent. of water, and the point to which the instrument sank in this solution was marked 15 degrees. The distance between the zero mark and the 15° mark was divided into 15 equal spaces, and the graduation continued beyond the 15° mark. This scale is used on hydrometers for testing the electrolyte of certain primary cells. The following table gives a comparison of this scale with the specific gravity scale:

Baumé Degrees.	Specific Gravity.
0.....	1.000
1.....	1.007
2.....	1.013
3.....	1.020
4.....	1.027
5.....	1.034
6.....	1.041
7.....	1.048
8.....	1.056
9.....	1.063
10.....	1.070
11.....	1.078
12.....	1.086
13.....	1.094
14.....	1.101
15.....	1.109

The Baumé scale for liquids lighter than water is of more interest, as it is used in this country for testing gasoline and other oils, although in France, where this scale originated, the gravity scale is now used for this purpose. This scale (Baumé) is obtained as follows: The point to which the instrument sinks into distilled water at 60° Fahr. is marked 10°. The point to which the instrument sinks into a 10 per cent. solution of sodium chloride (com-

mon salt) is marked zero. The space between these marks is then divided into ten equal divisions and the graduation continued beyond the 10° mark in the same manner—that is, the whole stem is divided into linear divisions equal to one-tenth the distance between the zero and 10° marks. Baumé only made hydrometers showing up to 50°, as at that time no lighter liquids were known or in use. But as the light distillates of petroleum, including gasoline, are lighter than 50° Baumé, the scale has recently been extended to 90°. The following table gives a comparison of that part of this scale which is likely to be useful to the automobilist in testing gasoline, with the specific gravity scale:

Baumé Degrees.	Specific Gravity.
64.....	.724
65.....	.720
66.....	.717
67.....	.713
68.....	.709
69.....	.706
70.....	.702
71.....	.699
72.....	.695
73.....	.692
74.....	.689
75.....	.685
76.....	.682
77.....	.679
78.....	.675
79.....	.672
80.....	.669

It will be seen that the two scales vary in opposite directions—that is, the smaller the specific gravity of the liquid, the greater its Baumé test. This is certainly somewhat confusing to the novice. A specific gravity of .700 corresponds to nearly 70° Baumé, and as this is about the density of the gasoline generally used for automobiles, there is considerable chance for confounding the two scales when speaking of the density of gasoline.

RANGE OF SCALES.

In order to make hydrometers compact and easy and accurate to read they are provided with only a small range of scale readings, and instruments are made specially for specific purposes, such as testing gasoline, alcohol, storage battery, electrolyte, etc. The average density of gasoline is about 70° Baumé, and a scale ranging from 60° to 80° Baumé is quite sufficient for a gasoline hydrometer. The density of the electrolyte in a lead storage battery varies approximately between 1.200 (at charge) and 1.120 (at discharge), so that an instrument graduated from 1.050 to 1.300 will be quite suitable for this purpose. A calcium chloride solution made by diluting one part of saturated solution with one part of water has a specific gravity of 1.22, and the density should never be allowed to exceed 1.30 to 1.32, so that a storage battery hydrometer may also be used for testing non-freezing solutions.



FIG. 1—GASOLINE HYDROMETER.

Fig. 1 shows a typical gasoline hydrometer for automobile purposes, which is made by Taylor Brothers, of Rochester, N. Y. The scale on the instrument has a range extending from 60° Baumé to 82° or 85° Baumé. The instrument is contained in a flannel bag, enclosed in a glass testing jar, and is enclosed in a nickel plated carrying case, 4½ inches long by 1 inch diameter. This case permits of car-

rying the instrument in the tool box without danger of injuring it. This same firm, we learn, will soon bring out a hydrometer combined with a thermometer on the same stem, to allow of readily making corrections for variations in temperature.

TEMPERATURE CORRECTION.

The density of every liquid varies with the temperature, and to ascertain the character of a liquid by its density the latter must be taken at a specified temperature—60° Fahr. Heat expands the gasoline—that is, makes it less dense—and, therefore, if a hydrometer reading be taken at a temperature above 60° Fahr. the liquid tested will show a lower density—that is, a higher degree Baumé—than at the normal temperature, and vice versa. For every eight degrees the thermometer is above 60, one degree should be subtracted from the reading of the hydrometer, and for every eight degrees the thermometer is below 60, one degree should be added to the Baumé degrees.

HYDROMETER SYRINGE.

Fig. 2 herewith shows a hydrometer syringe for use in connection with automobile storage batteries. This instrument is made by the Storage Battery Supply Company, of New York city. Automobile storage batteries, both those used for propulsion and those for ignition purposes, are entirely closed, except for a small filling hole in the cover, into which a perforated hard rubber plug is screwed. It is impossible to insert a hydrometer into the cell and read it, as, in the first place, the plates are very close together, leaving no room between them for the instrument; besides, as the cell is always of hard rubber, it would be impossible to read the instrument if it could be inserted. The only way of making a hydrometer test is, therefore, to draw some of the electrolyte from the cell and place the instrument in it. This is done very readily and in a very cleanly manner by means of the hydrometer syringe shown herewith. First the vent plug is unscrewed from the cover of the battery cell, and the tip of the syringe is inserted through the hole, with the rubber bulb of the syringe compressed. Then the bulb is released, the syringe partly fills with electrolyte, and the reading of the instrument can be taken through the wall of the syringe. The bulb is then compressed again, which ejects the electrolyte from the syringe back into the cell. The tip of the syringe need not be taken out of the cell, and there is therefore little chance of spilling any of the acid on one's clothes, etc. In storage battery work there is no necessity for such fine readings as in testing gasoline, and it is not customary to make corrections for variations in temperature.

In the subfigure in Fig. 2 is shown a special tip furnished with the hydrometer syringe for adjusting the liquid level in the cells. By resting the closed end of the tip on the electrodes and allowing the bulb to distend, any excess acid can be removed.



FIG. 2—STORAGE BATTERY HYDROMETER.

LESSONS OF THE ROAD.



Other People's Experiences.

By HARRY B. HAINES.

"Never trouble trouble till trouble troubles you" is an old adage and a good one, and as all is serene in the automobile world for me at present I take advantage of the welcome lull to narrate a few of the experiences of my friends who store their machines at the same garage where I put up. There are in this place at least eight machines of the same make as my own, and the men who own them, like myself, have things happen from time to time. One of the strangest automobile accidents occurred recently, when the angle iron frame on the left hand side of the front end snapped off short while ascending a hill. The whole motor, fan and all, were dropped down considerably over an inch, and the unsuspecting operator of the car didn't know that anything was wrong until the motor stopped, owing to the fact that the exhaust valve rocker arm was dropped below the level of the cam shaft, and the valve didn't work. He set his emergency brake and got out to see what was the matter. His first move was to turn over the motor and try to start it again, and finding that it did not respond he lifted up the floor boards and then, much to his surprise and consternation, discovered the true state of affairs.

Not knowing what to do he let the machine stand where it was and telephoned to the repair station for help. Two mechanics were sent out in another machine, and after looking around for a time they secured a section of a log 4 inches in diameter, and placing this across the floor of the carriage, with each end resting on the body, they raised up the motor by means of a jack and getting it level tied it securely with heavy rope. They were then able to start the motor, and the machine ran home under its own power. It has since been repaired, and is of course as good as ever now.

In this particular type of car there has been some trouble with the cast crank cases cracking. These cases are apparently not made heavy enough to stand the pounding occasioned by the heavy fly-wheel and the strain of the driving gears. As the entire main bearing of the machine, as well as the cylinder, depends on this case for support it would not be very healthy for the occupants of the machine were it to drop apart while the car was traveling over the roads.

What recalls this crank case weakness to my mind is the fact that one day while I was sitting in the auto station a telephone call was received from Asbury Park, and a well known local silk manufacturer, who was enjoying a trip down the Atlantic Coast, sent in word that he was stalled

there, his crank case being cracked. He was afraid to risk the run home, and a telegram was sent to the factory at once for another crank case. When it arrived a mechanic was dispatched with it, and after a day's hard work had the machine in commission again. It was necessary to block up the flywheel, motor and transmission in taking the old case out and replacing it with the new one.

Another of "our boarders," who made a trip from Paterson to Old Bridge and return, was stopped suddenly near New Brunswick by an inlet valve snapping off short. Aluminum nuts and washers were used on the early valves, and these gave some trouble, but it was not this that caused the valve to snap. It was clearly a case of flawed material. Luckily, the broken end of the valve did not get far enough in the crank case to mix things up with the piston.

The owner of the car, who is his own operator, had the machine towed into a barn, and taking off the inlet valve casting started for home by train. He was given the usual warm reception by the crowd at the station, who are always looking for a chance to sympathize with each other. A new valve was turned up and next day he went back alone to the stalled car, put the valve in place and came home under his own power.

Speaking about the personal supervision of autos by their owners and drivers, I can now say that I know from personal observation that there are some men running automobiles today who don't even know all the oil holes in their machines and who have seldom, if ever, gone over their car thoroughly with an oil can. It is all right to depend on the men at the garage to a certain extent, but when there are dozens of machines to be made ready and very few men to do the work, there is bound to be more or less carelessness and skipping of important oiling places.

I think I can say, without fear of contradiction, that no man is fit to own and run an automobile who is not willing to give it as much care as he would a horse. I would as soon think of taking out a valuable horse and giving it ice water to drink and a big feed after a long drive as to start out on an auto trip without oiling my machine myself in every bearing and moving part. If systematically neglected an automobile will find its way to the boneyard a lot quicker than its equine competitor.

There are certain facts about automobilizing which are self evident truths and which every automobilist should incorporate into his declaration of independence when he rebels, as all men do sooner or later, against the repair shop charges, the extortions of the road sharks and the nuisance of continual breakdowns and expert surveillance. Whether his machine be steam or gasoline, whether it has one or four cylinders, whether it cost \$600 or \$15,000, he must realize from the very beginning that constant care and at-

tention is the price that must be paid for reliability and good service, and that if he shirks the labor at the start his work will be doubly hard when, literally speaking, his car sits down to miles from nowhere and refuses to move another inch.

Many a man has worn out the hinges on his motor bonnet peering inside in a vain search for troubles that would never have occurred had his machine been given the proper attention at home.

Speaking of repair men and their homes, the garages, there seems to be a growing tendency on the part of automobile owners to break away from the stations and care for their machines in their own barns. A number of my friends have built auto houses and have been taking care of their own cars for the past few months, taking them to the repair station when any large repairs are needed. They are unanimous in the statement that they are getting better and more continued use out of their cars than ever before, and know more about their machines and are consequently less liable to be stalled on the road. The man who stores his auto at a station and asks expert advice for every little adjustment or strange noise gradually loses his self dependence and is at a loss when out on the road alone and anything happens.

The general tendency at the stations to overcharge for work done and to do poor work is causing auto owners to look around and see if they cannot take care of their own machines. The practice in some garages of using customers' machines for towing work, or pleasure riding by mechanics at night, is also working against the storage stations. It is my opinion that each year that passes will see more auto owners keeping and taking care of their own cars, but of course there will always be a certain class who will avail themselves of the convenience of the storage station. It would be a good thing for all concerned if the repair men would hire none but expert help and would, as in the old bicycle days, fix up a uniform schedule of prices, the same in all parts of each State. There would then be less dissatisfaction, and the honest men would make as much money as at present. It is the road sharks who would suffer, and it is time that some concerted action was taken by automobilists and the legitimate repair men and dealers to make these modern highwaymen feel the sting.

For cars which are stored away during the winter it is recommended in a foreign paper to pack the tires—both tubes and covers—in flour of sulphur, and it seems likely that good results might follow this treatment. It is claimed to preserve the elasticity of the rubber, to prevent it becoming brittle and to prolong its life. These advantages are, at any rate, good enough to warrant a trial, as sulphur is not unduly expensive, and as it is used in re-vulcanizing it cannot do any harm.

Auto Experience in Maryland.

BY WM. HOLLINGSWORTH.

In the spring of 1902 I developed a severe case of automobile fever. Having a practical knowledge of gasoline engines, and noting the large number of joints, pipes, gauges and other attachments of various kinds on the steamers, I decided to try a light gasoline car, if a good one at a moderate price could be found. A number of catalogues received from various manufacturers increased my desire to own a car.

After taking a couple of trips with the agents for a single cylinder runabout I concluded that the power was too small for Baltimore and vicinity, the low gear having to be used too much. Believing that a high grade second hand machine in good condition would give better results than a cheap new one of less power, the mails, telephone and railroads were made vigorous use of in the endeavor to locate one of the former kind. A trip to Washington proved unsuccessful, no second hand gasoline cars being found, though quite a lot of steamers were awaiting purchasers. After waiting a few days a trip to Philadelphia was taken, where a number of second hand gasoline machines of various kinds were found for sale. One acquaintance, who was using an air cooled three wheeler, and another using a light steamer, had each taken a ride in a phaeton with an inclined three cylinder engine, and were so enthusiastic over it that I went on a hunt for one, so a personal inspection could be made and a trip taken in it.

FIRST FINDS NOT ATTRACTIVE.

At a station on Broad street two of them were found, but their appearance was not inviting, one having just had a front seat added, and only a priming coat of paint on it. However, I willingly accepted an invitation to step in and take a ride. The chauffeur, a colored boy, gave the crank a turn, and the motor started off at once. After going about 200 yards up Broad street the motor stopped, for a very good reason—the gasoline tank being empty. Two gallons were quickly brought and poured in, and away we went for a short but pleasant trip, which increased my desire for a machine of that make; but appearances were against these two. The one mentioned had large, ugly ratchet wheels on the hubs of the rear wheels, and pawls attached to the running gear, which the owner had put on to prevent running backward when stopping on hills, the brake having no lock on it. These pawls had been in contact with the spokes, and had badly disfigured them.

Another carriage of the same make was soon found, which had been used about eight months and which made a fine appearance. It was a case of "love at first sight," and going for a short ride with the owner a bargain was made before we returned. A few days later the car arrived in Baltimore by rail, in good condition and

with plenty of gasoline and water in the tanks. Having had no experience whatever in handling automobiles, and less than two hours riding in them, I felt a little nervous while running it over 2 miles of rough pavements, much of it cobblestone with large holes in it. The low gear only was used on this trip, and no chances of accident were taken.

THE FIRST DRIVE.

After going about one-third of the distance a loud knocking was heard under the seat where the engine was located. It was caused by a riveted joint in the magneto belt coming loose at one end, and was stopped by cutting off the loose part. The trip was then resumed, and the garage reached in safety. The engine was very hot from working so long on low gear. A general examination revealed that one of the bevel gears on the axle was loose, the key being very loose in its seat, allowing the gear to work away from the pinions of the balance gear until they meshed only about half as deep as they should have done.

The springs had but one leaf, and had settled so much that a small jolt would cause the muffler to strike the axle. Though I had no claim on the manufacturers, they replaced the springs free of charge with others having four leaves, and they are very satisfactory. I wish to state here that I have always been treated in a most liberal and considerate manner by the makers; all questions are promptly answered, and new parts furnished at a low price, in some cases, I am sure, at less than the cost to them.

After making needed repairs to the running gear, most of which were known to be needed when the car was purchased, a short trip was taken, but mostly on the low gear, as the necessary experience had not been acquired to handle the car safely at high speed. After a few trips, however, it became as easy as driving a horse, only one hand being needed for full control, except in close places or deep mud or sand. The one hand control had been the only point objected to by my acquaintances, though they had not tried it, but I find it entirely satisfactory in every way.

DECIDE ON A HOLIDAY TRIP.

Having enjoyed many short trips in June, my wife and I decided to try a 28 mile run through the country on July 4. The previous evening the motor had shown an unusual weakness on a hill while running on the high gear, though it kept up fairly well on the low gear. On opening the drain cock in the bottom of the gasoline tank quite a lot of muddy water and rusty sediment ran out, and the motor was soon running as well as ever. Since that time I usually open the cock for a moment before starting out, and nearly always find sediment and a few drops of water present, in spite of the fact that there is a fine mesh screen in the fill pipe and another in the funnel.

On July 3 there was a heavy storm of wind and rain, but the Fourth was a beautiful day; it was warm, but clouds partly obscured the sun much of the time. We left Walbrook, the extreme northwestern part of the city, at 7 a. m., expecting to arrive at Wheel, Md., before 10 a. m.—but we didn't. For most of the way the roads and streets were excellent. After a pleasant and continuous run of exactly an hour the odometer registered 14 miles, 6 of which were made in crossing the city, and the full hour's run was made without throwing out the high speed clutch, the speed being regulated entirely by the throttle. Soon after this stop, which was only for the purpose of examining the odometer, the effects of the storm became more apparent, branches of trees being strewn over the road, while many wires and poles were down. As many as six poles were leaning over the road at one place and were only prevented from falling by the wires which had not broken. Some hung so low that they barely cleared the top of the carriage. At 18 miles a large oak tree had fallen across the road, completely blocking it. A woman standing in the road said it was impossible for us to go farther, and also that there were no roads by which we could get around the obstruction. The idea of returning home when so near our destination was not pleasant, and noticing wagon tracks up a steep bank and into a corn field, we concluded to try to get through that way. The bank was quite steep, and about thirty telegraph wires on the ground had to be run over. With my wife keeping a sharp lookout to give warning if any of the wires became entangled in the running gear, we went up the bank on low gear. When near the top a sharp click was heard, but as we were moving along nicely no attention was paid to it.

THROUGH A CORNFIELD.

After about 100 yards' run through the cornfield we came to another opening in the fence where the wagon had passed out, and which was badly washed, there being a deep gully in the middle. Passing through to the road in safety, the steering wheels were pointed down the road, but the carriage went straight across, pushing the front wheels sidewise. Not having had sufficient experience to diagnose the trouble, I got out, pushed the carriage back into the road and started off. We ran along for a couple of miles, part of the time at a rate of over 20 miles per hour. After coasting down a long hill, reaching a nice, level, shady part of the road, and just as the throttle was opened wider, the carriage stopped and a sound came from under the seat as though the motor was making scrap of the mechanism. Losing no time in stopping the motor and getting out, it was found that the eyebolt which held the chain in proper adjustment had broken, allowing the chain to get off the large sprocket wheel.

Just then a young man on a bicycle came along, who volunteered to take the bolt, and

a blacksmith shop, a mile ahead, to have it welded. Though a holiday, the smith was found and he did a very creditable job. While the volunteer messenger was gone to the shop it was found that the half inch bolt which screwed into the eye was cracked in the thread, so I started off to the shop on foot. I arrived in time to give some needed instructions about the proper offset the bolt should have, and then proceeded to make a new half inch bolt out of an old one dug out of the scrap box, cutting the thread and retapping the eyebolt with some practically worn out taps and dies. The walk back added nothing to the day's pleasure. The bolts were soon put in place and the chain properly adjusted.

DIFFERENTIAL PINION BREAKS.

On replacing the chain on the large sprocket wheel it was noticed that one of the small bevel balance pinions was broken, having split into several pieces, the parts of which were jammed between the larger ones. This explained the click heard when going up the bank into the cornfield, and also the refusal of the carriage to follow the steering wheels, as the pieces of broken gear had prevented the rear wheels from turning independently of each other.

The rear axle was soon pried up—I now carry a home made jack made of a piece of three-quarter inch pipe with a flange for a base, and a three-quarter inch bolt having a long thread and forked head, which is entirely satisfactory and takes little room—when the wheel and sleeve were slipped off enough to allow the broken pieces of gear to drop out and then reset. As there were still three small gears in service, no more trouble was experienced from that source, and we were soon started on our way. Our hopes that the bolt would stand the strain were soon shattered, however, for after 150 yards of travel up hill off came the chain, and the bolt was badly bent where welded. A fence stake was used to pry it straight enough to allow its being again unscrewed out of the threaded boss. Our friend the bicyclist, who had faithfully stood by us for some hours, again came up and took the bolt back to the smith to be shaped up. The total charge by the smith for his work and the use of his tools was 50 cents.

It was now plain that if any headway was to be made a substitute for the broken boss must be found. After again replacing the refractory bolt a piece of one-eighth inch copper wire from the tool box was carefully wrapped around, binding it tight in place, and the wire stayed in place until taken off at the end of the trip. Some colored men from a neighboring house also assisted at the ceremonies, and brought a basin, water, soap and towel, which I certainly needed. A deserved tip made them happy, though they showed no signs of expecting anything. Starting off again we ran about 6 miles farther, when off came the chain again, wrecking the



GORDON BENNETT COURSE—A TURN JUST BEYOND LIMBURG.

brake, a rivet head on chain catching on the brake wire. The troubles were becoming rather too frequent for comfort, as each time the chain came off (and it did so five times in all) two cells of battery, one side panel, one one-half inch bolt and one chain screw and lock nut had to be removed and replaced (matters are arranged differently now) and two wood screens that held a clamp over the batteries taken out. The parts were so hot that I blistered my hands. I had on a new serge suit and a white straw hat, but never mind what happened to them.

AN INGLORIOUS ARRIVAL.

The offset bolt was, of course, made softer and weaker by the heat of welding, and while it did not break it was continually bending in the offset, and all I could do was to turn it in the thread to allow for the bending each time the chain came off. After worrying along to a grade a

mile from our destination the chain came off again, and I decided I had enough for one day, as two heavy grades were still to be gone over, and the bolt simply would not stand up. From a convenient farmhouse a "phone" message was sent, and in a short while a cousin came out on horseback, followed by his sister in a buggy. While we were waiting the chain was replaced, to be used as a brake, it staying on when used for this purpose, the slack then being on top. A procession not triumphal—unless it was for the hay motor—was then formed in the following order: Hay motor drawing buggy containing my wife and cousin; half inch rope connecting buggy to auto, which contained your humbled servant, and a rear guard consisting of the other hay motor carrying the other cousin. Unfortunately the kodak was at home or I would send a picture of it. This was the first time my carriage had not been propelled by its own motor, and



GORDON BENNETT COURSE—THE DESCENT INTO WEILBURG.

then the motor was ready, but, of course, was useless with no chain in place.

We arrived about 4:30 p. m., hot, hungry and about tired out. My relatives have a wheel factory and a blacksmith's shop in connection with it, which was one reason I kept on instead of trying to return home. As it was Friday and I wished to be back ready for business on the following Monday, I started early Saturday morning to make permanent repairs. I found a first class smith who forged new parts as directed, while I finished them up and put them in place. The weak bolt was abandoned, and a new steel bolt made so that the distance rod connection is now many times as strong as formerly, and the chain can be tightened quickly and with ease, no parts having to be removed to do it. The brake band is covered with leather, and when in use is expanded inside the rim of the large sprocket wheel. When the chain caught the brake wire it broke a piece out of the band, bent it out of shape, put several kinks in the wire and forced up part of the floor by pulling back on the lever. The wire was straightened cold and is still in use.

THE START HOME.

Permanent repairs were completed on Saturday evening, and no trouble has been had with these parts since. Not wishing to make the return trip at night a severe test was made that evening by taking three adults down and up a very steep, rough hill, and then a run of 3 or 4 miles was made over other rough, hilly roads. My wife, being disgusted with the trip out, returned by rail on Saturday evening. I made the return trip alone on the following morning, going back by another and much longer route. The trip out was 28 miles by the odometer, while the return was 36 miles, which took three hours and twenty minutes. I was in no way discouraged, knowing a weak point had been re-

moved, but wondered what would show up next.

A short time after returning, while on St. Charles avenue, there was another click heard, similar to the one heard while entering the cornfield. As we were going straight ahead no stop was made until we tried to turn into a cross road, when the auto repeated the trick of not following the steering wheels. Jacking up the rear axle, and spreading the large bevel gears apart, allowed the removal of the remains of another small gear, leaving but two in service, the first one to break not having been replaced. As the pinions were of steel with cast teeth, the same as the side gears, they must have been somewhat irregular in the spacing of the teeth and all the strain may at times have come on but one of the pinions. A new set of machine steel gears, with cut and hardened teeth, had been ordered, but had not arrived at that time.

AXLE BREAKS.

The live rear axle of 1½ inches diameter had always seemed too light, the sag in the middle and spreading of the wheels at the bottom being very noticeable. When the manufacturers sent on the new springs I wrote them that the axle would be likely to break, as the stronger springs would give it more severe shocks. They replied that I need fear no trouble on that account, but after about 12 miles running with the new springs the axle broke without a sound or warning of any kind. It was on a Saturday night, and we were on the asphalt pavement on Fulton avenue, moving very slowly, when we were dropped without a jar, the tires of the rear wheels coming over against the sides of the body, while the broken ends of the axle hung in the air. The fracture showed a gradual breakage, the surfaces near the outside being rusty. I boarded a car and went to my shop, where I found a sleeve coupling of 1 7-16 inch bore having eight

set screws in it. Returning to the car I jacked up the axle, took off the muffler to make room for the coupling, and ran it into a nearby living stable, with its own motor.

THROUGH THE CITY WITH MUFFLER OFF.

On the following Monday I met one of my machinists at the stable at 6 o'clock a. m., hoping to get the car down town before many teams were on the street. We had about 2½ miles to go, and it was much like a miniature Fourth of July celebration, especially on the up grades, owing to the absence of the muffler. All went well until Calvert and Eager streets were reached, when the axle worked out of one end of the coupling, and down it went again, a large section of the rubber surface of one tire being torn loose where it dragged against a sharp corner of the body. Jacking up the third time and replacing coupling we were soon on our way again, but within three squares the axle broke off in another place, owing to the coupling not holding the two parts in line. We were now within two squares of the garage and I was determined to go in on my own power.

Going back to the shop, two sleeve castings were soon made into couplings and placed on the axle, and they held until the trip was finished. The carriage was taken up on the elevator to the second floor and propped up to await a new axle. After some correspondence with the factory a new 1½ inch axle was ordered and hub bushings to suit. They sent on a duplicate of the old one to be used while the larger one was being made, but hoping to get the larger one soon I did not put it in.

After about two months' waiting it came, and a beautiful piece of work it was, with steel gears, long bronze bearings, bushings for the wheels, with taper square holes in them, and a steel sleeve, with one of the large gears brazed on near its inner end. The price charged seemed to be about half the cost of making it, and the remains of the old one. Being so late in the season it was used but little last fall.

TROUBLES EFFACED BY ENJOYABLE TRIPS.

This list of troubles may seem large, but they have quickly passed from the mind because of the many enjoyable trips taken, and the carriage is better now, except for paint, than when I bought it. I frequently take a 15 or 20 mile run in an hour and a half, and a short while ago ran 35 miles in two hours and ten minutes, with no attempt to make a fast trip. The low gear is rarely used, as I seldom find a hill that I cannot take on the high gear. I can stop on a 6 per cent. grade, take on a 180 pound person, start on the high gear and be under full headway within 100 feet distance.

I have had no trouble whatever on the road with the engine or sparkers, which are of the make and break type. Have had the engine show weakness when water was in the gasoline, or when I allowed the



GORDON BENNETT COURSE—A LONG STRAIGHTAWAY AT OBERETZEN.

cooling water to boil away too much, but as soon as the water tank is refilled, or the water taken out of the gasoline, it gets back to work at once.

Next Year's Gordon Bennett Race.

The A. C. A. will receive entries for the cup race under the following conditions:

(1) Each entrant shall deposit with this club the sum of \$600. (2) The racing committee of this club shall decide which of the entrants may compete in the cup race. This decision may be arrived at by a contest, or by the committee without a contest. (3) Any entrant who is not nominated by the racing committee for the cup race shall have his entrance fee returned to him. (4) Any entrant who, after being nominated for the cup race by the committee, does not start shall forfeit his entrance fee of \$600. (5) If three entrants are nominated to take part in the cup race each entrant shall have two-thirds of his entrance fee (after deducting his proportion of the expenses incurred in holding the race) returned to him, provided he starts in the race. (6) If two entrants are nominated each of such entrants shall have one-half of his entrance fee (after deducting his proportion of the expenses incurred in holding the race) returned to him, provided he starts in the race.

The Limburg-Saalburg course, described in a recent issue of *The Horseless Age* has been definitely selected to hold the race on. A number of photographs of this course are shown in this issue.

The German Automobile Club has appointed a committee which will have all the arrangements in hand. This committee includes the Duke of Mecklenburg.

Regarding the French cup qualifying race we read in the *Autocar* that the sporting committee of the A. C. F. have just published the regulations for the qualifying race, which is to take place, if possible, a month before the date of the Gordon Bennett Cup event. The length of the course to be selected will not be less than 550 kilometres and not more than 600 kilometres. Nothing is said about the site of the race, but it is understood that the committee are thinking of running it over the Argonne circuit, in the east of France, and this course is to be prospectively to see if it fulfills the necessary conditions. Failing permission to race in France, the committee have received a proposal to run off the event in Algeria, where the local automobile club is at present engaged in mapping out a number of courses. The chances, however, are so greatly in favor of the Government authorizing a race, which is regarded as of such vital interest to the automobile industry, that it is hardly likely the committee will be under the necessity of accepting the Algerian offer. Each maker will be allowed to enter three cars, and for each vehicle he will have to pay an entrance fee of £200, which will go toward the expense of organizing the race. If the



GORDON BENNETT COURSE—A SHARP TURN NEAR OBERETZEN.

total fees more than cover the expense, the balance will be divided equally among the competitors finishing the course within a given time.

Notes on Castings for Automobiles.

It is sometimes asserted that the castings employed in American motor cars are not as good as those in French machines. However that may be, it is certain that many castings used for automobiles in this country are not what they should be. The fault lies sometimes with the pattern maker, and patterns are frequently observed which are not parted in the proper manner, so as to allow the foundryman to accurately set his cores, the work in hand being completely covered or hidden from view by the core, whereas with the proper parting of the pattern the work would be in full view and the foundryman could set his cores with accuracy.

Then, again, we have the commercial foundry, with a small cupola of 7 or 8 ton capacity, 90 per cent. of the output of which consists of rough castings, such as sash weight columns, stays, etc., for which a poor grade of iron is as good as the best. This foundry, in order to compete in price on low grade work, is compelled to pour the inferior iron, not having enough high grade work nor the capacity to run off a separate heat.

Experts familiar with both the French and domestic molding sands state that the domestic, known as the Albany sand, is as good as any known, and is given the preference in many instances. The sand question is of only slight importance in obtaining smooth castings, as the smoothness depends upon the care exercised in the facing of the mold with silver lead or graphite and the grade of lead used.

The proper mixture of the Southern and Pennsylvania iron is equal, if not superior, to the best European iron for castings, and in the hands of a skilled foundry-

man any grade can be had to suit the different requirements.

The following is a mixture poured by a well known foundry, and shows the ingredients necessary to produce a smooth, soft gray iron model casting, so essential in hydrocarbon engine work:

Phosphorus	820
Manganese	56
Sulphur	.062
Silicon	2.68

The presence of sulphur conduces to unsound castings, and the percentage of sulphur present is therefore kept small, while the high per cent. of silicon makes the iron tenacious and strong, and gives it a close, even grain. A test bar 14 inches long by 1 inch square takes 3,000 pounds transverse strain to break, showing a test far above the Government requirements. This iron is easily machined and takes a high mirror polish, which is so desirable and necessary in cylinder work, while the softness allows an even and practically frictionless wear.

Calendar of Automobile Dates and Events.

- December 10 to 25—Paris Automobile Exhibition.
- January 16 to 23—Madison Square Garden Automobile Show.
- January 23 to February 4—Brussels Show.
- January 25 to February 6—Meet of the Florida East Coast Automobile Association.
- February 6 to 13—Chicago Automobile Show.
- February 12 to 24—Crystal Palace Show, London.
- February 15 to 20—Detroit Automobile Show.
- March 6 to 12—Buffalo Automobile and Sportsman Show.
- March 14 to 19—Boston Automobile Show.
- March 19 to 26—Agricultural Hall Show, London.
- March 21 to 26—Washington Automobile Show.

Storage Battery Lecture at the A. C. A.

The last of the two lectures on storage batteries was delivered by Lamar Lyndon at the A. C. A. club rooms on Tuesday night, December 1. Mr. Lyndon explained that the cause of the drop in voltage in a storage battery during discharge is the reduction in the density of the electrolyte. He showed by an experiment that pure spongy lead and pure lead peroxide are better conductors than spongy lead and lead peroxide mixed with lead sulphate—these mixtures representing the active material of a cell toward the end of discharge. It was then shown how a storage battery can be formed by just submerging two lead strips in a sulphuric acid solution and passing an electric current through them. This process was employed by Plante, who invented the storage battery, in 1861. The complete formation of the battery in this manner requires repeated reversal of the current, and is very tedious and expensive. At present the plates are treated with nitric, acetic or hydrochloric acid, which admits of forming Plante electrodes in a comparatively short time. Faure conceived the idea of applying the materials to become active to the lead plate already formed. These materials consist of red lead and litharge, which are mixed with water to make a paste. This paste must have incorporated in it some binding material to make it hard and adhesive. Sulphuric acid will serve this purpose. Frequently also ingredients are added to make the active material more porous, as, for instance, pulverized pumice stone. An addition of antimony to the lead of the grid enables it to better resist the action of the acid, and also adds to its mechanical rigidity.

The lecturer exhibited and illustrated on the screen the plates or grids of most of the storage batteries now on the American market. He said that only the pasted plate battery was suitable for motor car purposes. The Plante plate battery was excellent for stationary work, but it was generally recognized that it was too heavy for automobiles.

One cause of trouble with storage batteries is the clogging of the pores of the spongy lead on the negative plate. This is frequently due to impurities in the electrolyte, which are always attracted toward the negative electrode; it may also be due to sulphating, as the sulphate also tends to clog the pores. The remedy is to reverse the battery, which will cast out the impurities, so to speak, and then change the electrolyte. If the clogging is due to sulphating, the trouble may be remedied by subjecting the battery to a long overcharge. Another trouble frequently experienced is that of loss of active material. This is often due to the formation of a layer of sulphate between the active material and the grid. If the trouble is noticed early enough it may sometimes be remedied by long overcharges, but if the

layer of sulphate extends over nearly the entire surface of the grid there is no remedy, and the electrodes must be replaced with new ones.

Another cause of trouble with storage batteries is corrosion of the grids, which is due either to excessive density of the electrolyte or to the presence of acids which strongly attack the lead. The density of the electrolyte should never be allowed to exceed 1.265. Another trouble with the batteries is the buckling of the plates, which is also due to sulphating. The sulphate formed expands and causes the plate to warp or buckle, the effect being sometimes so strong as to break the plate in two. Buckling may be said always to be caused by over-discharge, although this over-discharge need not take place through the motor circuit, but may occur internally of the battery. An over-discharge is always accompanied by excessive formation of sulphate, and the expansion force of the large amount of sulphate exerts a strong buckling action.

Sometimes one or more of the cells in a battery will reverse, which is a sign that these cells are of lower capacity than the rest. The reduction of capacity in these cells may be due to excessive shedding of active material. The amount of electrolyte necessary is determined by the capacity of the cell; the quantity used should not be less than 4 pounds for every 100 ampere hours capacity. The capacity of a cell depends equally on both electrodes, and if one of the electrodes should be entirely discharged any unredacted active material on the other electrode would be of no use. The only method of determining the equality in the capacity of the two electrodes is to make a so-called cadmium test. It consists in inserting a small piece of cadmium in the electrolyte and measuring the voltage between it and either of the two electrodes.

The normal difference of potential between the cadmium and the negative electrode is .18 volt.

If a storage battery is to be charged rapidly, the best method is to get all the charge possible into it at the beginning of the charge. For a three hours charge the battery should receive 50 per cent. of the total charge during the first hour, 33.3 per cent. during the second hour, and 16.2-3 per cent. during the third hour. The battery should never be allowed to stand in a discharged condition for any length of time. The acid density in each cell should be tested at least once every two weeks, and additions should be made to the electrolyte regularly to maintain its proper level and allow for evaporation, spilling and leakage. It is not correct to always add solution to the electrolyte, as the evaporation consists of water only, and the continual addition of solution would finally result in a too dense electrolyte. In most cases the simple addition of water will suffice. The water should be introduced to the bottom of the cell.

Obituary.

Count Gaston de Chasseloup-Laubat, one of the pioneers and active promoters of the automobile movement in France, died near Cannes, in Southern France, last month at the age of thirty-seven years. He was educated as an engineer. His first work in connection with the automobile movement was his participation in the organization of the first automobile race from Paris to Bordeaux and back in 1895. In the Marseilles-Monte Carlo race in 1897 he took part with a De Dion steam omnibus and won. He became acquainted with Jean-taud, who built a fast electric car for him, with which he repeatedly broke the kilometre record on the Acheres road in 1899, he and Jenatyn alternately breaking one another's record, until Jenatyn finally built his Janais Contente, which retained the final victory. Chasseloup-Laubat took part in the organization of all the great international races up to and including the Paris-Vienna in 1902. In 1900 he was general secretary of the first International Automobile Congress. Being somewhat familiar with conditions in the United States, through his visit here in 1893, during the time of the Chicago Exposition, he read a paper on "Automobile Development in the United States" before the congress, besides other papers of historical and technical character. He participated in the discussion of nearly all the papers, and in the discussion of a paper on condensation on steam cars got into a somewhat animated verbal tilt with one of the American delegates, Major Howard. Chasseloup-Laubat proposed two resolutions—(1) that the congress recommend the exclusive use of water tube boilers on steam cars; (2) that it recommend the use, for light steam cars, of liquid fuel which would not volatilize at ordinary temperatures. Major Howard strenuously objected to both these resolutions. He claimed that the President of the United States rode in a light steam carriage which was neither equipped with a water tube boiler nor used heavy liquid fuel, and that 2,000 of these cars were in use and none had ever been known to explode.

Chasseloup-Laubat had been suffering for several years and spent one winter in Algiers, but he did not regain his health. The count was known in French automobile circles as a man of much technical and organizational ability and of a very amiable disposition. His name deserves a conspicuous place in the annals of automobile history.

An Automobile Surgical Kit.

A Frenchman has invented an automobile surgical kit containing a selection of medicines in tablets, with directions for use. There are remedies for influenza, bruises and irritation of the eyes, and also a number of surgical instruments, sterilized silk, amica and ether.

COMMUNICATIONS.

The Improved Highway Across the Hackensack Meadows.

Editor HORSELESS AGE:

It is perhaps not generally known by the lovers of automobile riding that the threshold of the most enjoyable region for such recreation in the United States is within 10 miles of the New York City Hall. The Watchung, or Orange, Mountain, lying between Paterson and Milburn, N. J., for a distance of 15 miles rises to an average height of 600 feet, and along the eastern slope is a belt of suburban improvements, 2 or 3 miles in width, embracing all the refinements of a high civilization, exhibited in the beautiful architecture and elegant grounds of wealthy and cultured inhabitants, and extensive public and private parks costing many millions of dollars.

Essex County parks, nine in number, have an aggregate area of 3,550 acres, of which one in Newark and another in Orange are already completed, with elegant roadways throughout.

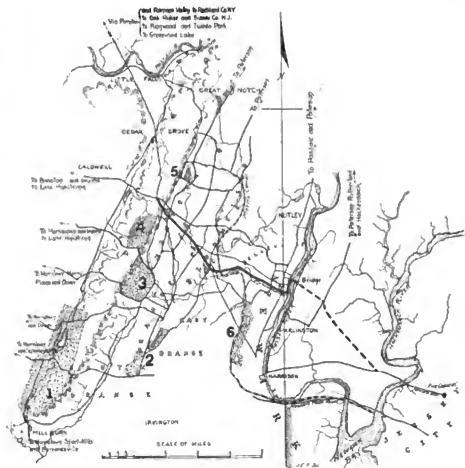
But what is especially appreciated by automobilists is the most perfect system of country roads in the land.

The extensive construction of these roads was commenced more than thirty years ago, being initiated by special legislation for Essex County, under which seven county roads were projected to radiate from Newark to the extreme boundary of the county. These constituted the framework on which connecting roads have since been built by the towns, so that at the present time Essex County alone can boast of more than 300 miles of well graded, macadamized roadways.

This county is now the Mecca for pilgrim officials from every State in the Union who, in search of information, come to learn the lessons to guide them in road building in their respective localities.

But the attractions for the automobilist have just begun when he has reached the summit of Watchung Mountain. Delaying here a little while to look down upon the lovely region he has traversed and to bestow a farewell gaze upon the great city on the eastern horizon, he can continue his journey over the same perfect roads through the wonderfully picturesque country across the State to its northern and western boundaries.

The reason that this paradise for automobilists, wheelmen and horsemen has heretofore been almost a forbidden field, except for those who reside in it, is found in the fact that it could not be reached from the east without traveling over an interposing barrier of most disgraceful and detestable thoroughfares for a distance of 8 or 9 miles across the Hackensack Meadows. It is, therefore, a pleasure to announce that this obstruction to the wel-



fare of the public will soon be considerably relieved by the intelligent action of the Hudson County Freeholders, who are now reconstructing the long neglected Belleville turnpike, which connects Jersey City with Belleville. This thoroughfare is being built on the most approved modern methods, and when finished will be comparatively free from the throng of commercial traffic existing on the plank road and Newark turnpike. It will also give an immediate connection at Belleville with the entire system of country roads above described, avoiding the crowded streets and rough pavements of Newark. A map and explanations of the routes and itineraries which will become possible by this improvement, to be completed before spring, are given herewith.

The trunk line of the system of country roads, outside of the cities, will be the "Second River" road, southerly from Belleville bridge, by which with an easy grade we reach Bloomfield Centre; thence via Bloomfield avenue through Montclair to the summit of Orange Mountain, at an elevation of 550 feet. This route, like most others of the system, is bordered by shady elms and maples, and except in the central part of the villages is environed by handsome residences surrounded by ornamental lawns and trees. The grade, of an average of only 100 feet per mile, and the depression at the summit of Orange Mountain, make it the easiest route across the mountain to the country beyond.

No more magnificent drive can be found in New Jersey than through Mountain avenue and Upper Mountain avenue, Montclair, on the eastern slope of Orange Mountain. At an elevation of 400 feet the road, nearly level for a distance of 5 miles, is like a continuous park with beautiful lawns and abundant shade, which adorn the elegant residences along the route, relieved occasionally by a bit of forest growth. The view toward the east is superb, and the climax in scenery is reached when at the summit of the Little Falls road, west of Montclair Heights, our vision turns toward the eastern horizon to include the great metropolis and many miles beyond, and again toward the western sky line 25 miles distant. This is the most desirable route to Pompton, from which radiate three main avenues of excellent roadways toward the west, north and northeast respectively to great distances.

This beautiful region has been practically inaccessible from Jersey City and Hoboken for the want of a suitable connection across the Hackensack Meadows. Hudson County, in whose jurisdiction this territory lies, has been apathetic and tardy in the great movement which has inspired the State of New Jersey at large in constructing good public roads. The law providing State aid in the construction of roads has been in force for ten years and has been availed of by the other counties of the State to the full amount allowed under the law, but Hudson County has failed to re-

ceive its proportional allotment because it has never, until recently, asked for it. The improvement of the Belleville turnpike is a portent of better things to come. The recent acceptance by the county of the law creating a board of park commissioners and the wise appointment of judicious and intelligent men to that office is a promise of greater improvements in the future.

For the present, and until the Belleville turnpike is reconstructed, the following is the least objectionable route to Belleville Bridge:

From the Hoboken, Erie and Pennsylvania ferries the roads through Jersey City converge and meet at Five Corners on Jersey City Heights; thence the route will be via Newark turnpike to near the Passaic River at East Newark. At East Newark a macadamized road leads along the east bank of the Passaic northerly to Belleville Bridge, from which the trunk line of the Essex County roads leads into the vast system above described without traversing the crowded and roughly paved streets of Newark.

The routes of "least resistance" in crossing Jersey City are as follows:

From Pennsylvania ferry turn into York street; up York street to Henderson street; thence north two blocks to Mercer street; up Mercer street viaduct and Glenwood avenue to the Boulevard; north via Boulevard to Newark avenue; thence to Hackensack Bridge.

From Erie ferry, up Pavonia avenue to Hamilton Park; thence north four blocks to Thirteenth street; thence to Newark avenue and Hackensack Bridge.

From Hoboken ferry, via Ferry street to Hoboken avenue, to Five Corners; thence to Hackensack Bridge.

MONTCLAIR.

Performances in the Eagle Rock Hill Test.

Editor HORSELESS AGE:

I note with satisfaction that in your issue of December 2, in commenting on the Eagle Rock hill climbing contest, you have called attention to the stripping of cars, and state that "no record was made of whether a car was stripped or in touring condition, and the reader of the results will not know exactly what the performance amounts to, as the difference in hill climbing ability when the car is stripped and when it carries its body is considerable."

Many prospective purchasers are misled by performances of this kind; for instance, one make of car which negotiated the hill stripped in 3m. 19s. took 8m. 5s. to do it with the body on. The records do not show the difference in the conditions, but would convey the impression that they were alike in both cases.

As a contestant, I would like the privilege of stating through your columns that my car in events Nos. 1 and 7 car-

ried its body and was in touring condition.

GEORGE PADDOCK.

[The statement made by our correspondent that one make of car made the ascent stripped in 3m. 19 s. but took 8m. 5s. to do it with body on might mislead, as this great difference in time is certainly not solely due to the difference in weight represented by the body. In fact, one car of this make made the ascent with body on in 4m. 17s, which performance corresponds well with that made with the stripped car. The machine which occupied a time of 8m. 5s. was evidently not in condition.—Ed.]

The Advantages of Organization.

Editor HORSELESS AGE:

Dr. F. K.'s remarks about the L. A. W. and its good influence, in your issue of November 25, are suggestive of the advantages that automobilists may derive if they will but join hands in their efforts to secure the best conditions for the new method of locomotion. The L. A. W. was a power because it had a large number of members, and many of these members not only contributed their dollars but much of their influence to secure the desired result. Realizing that automobilists would have much the same battle to fight, the American Motor League was organized in 1895, and while it could not work then because of lack of members, it is now getting the members and getting into position to take up the work where the L. A. W. left it. With the rapidly increasing army of automobilists a league of users will be able to direct legislation and see that the laws favoring automobilists are enforced.

CHARLES E. DURYEA.

Spark Plugs.

Editor HORSELESS AGE:

The writer would like to ask if a spark plug is supposed to deteriorate more rapidly in a high speed motor than in a slow running four cycle type? In other words, is it the total number of sparks the plug produces that wears it out? If so, it must last just one-half the time in a high speed motor it would in a slow speed.

I have had a good deal of trouble with plugs. Some will go back on me without warning. A good mica plug made by a reputable concern, guaranteed for ninety days, ran four weeks, and probably did not cover 150 miles. The last day of its operation it was apparently in perfect order. The following morning being cold and frosty, I could not start, and blamed almost everything else except the plug. It looked to be in perfect condition, yet would not move the motor. A new plug inserted began work at the first pull. The defective plug was returned to the factory, and the manufacturers dissected it, but could discover nothing wrong. Possibly a stronger current would have solved the problem. When the motor "skips" slight-

ly I find it can often be corrected at once by a new plug. I have come to carry three or four extra plugs with me even when running about home. When the motor is running smoothly I sometimes put them in one after the other and test them. Then I feel ready for an emergency. Next to the tire problem, that of spark plugs is certainly the most important.

E. D. PANNELL.

[The burning away of the spark points depends upon the number of sparks produced, and if a plug fails from this cause its period of life should depend upon the speed of the engine. If, however, the cause of failure is deterioration of the insulation, there would hardly be any relation between the motor speed and the life of the plug.—Ed.]

Cylinder Oil as a Non-Freezing Liquid.

Editor HORSELESS AGE:

I, like many others, am interested in the problem of a solution for cooling tank for winter running. I hesitate to use the calcium chloride mixture on account of the chance of injury to cylinder through faulty gaskets, corrosion in galvanized iron tank, etc.

I subjected a 20 per cent. solution of glycerine and water to a temperature of 12° Fahr. and found it crystallized. Inverting the vessel in which I made the test, I found it changed from a liquid to practically a solid. It had not expanded to an extent to do harm in cooling pipes, but if the radiator were filled with the substance in this condition it would have to be thawed out before circulation could be established. In my search I procured a sample of limpid cylinder oil that has to do service in a refrigerating machine at fully 10° below zero, and at that temperature it does not coagulate.

As an absorbent of heat, what percentage would it fall below water? Would there be any detrimental features in its use for cooling beyond rotting the hose connections?

To facilitate my work I need to use my runabout as many days in the year as possible. Kindly enlighten me as to above.

GEORGE W. RUTLEDGE.

[The cylinder wall will get hotter with the oil for cooling than with water—(1) because the oil has a lower capacity for heat than water, and with a constant speed of circulation a greater difference of temperature in the system is necessary to convey a certain amount of heat; (2) the oil being more viscous, the resistance to circulation is greater. Cylinder oil is a very uncertain substance, and we are not able to tell what the specific heat and viscosity of the grade you employ are. It is, however, not unlikely that in cold weather the oil will circulate with sufficient rapidity to keep the cylinder temperature normal. Perhaps a worse objection to the oil for cooling purposes than its effect on the

hose connections is its dust gathering quality. In case any of it should spill over or leak out around pipe joints, it will at once absorb the dust of the road. —Ed.]

Interesting Feature of Stanley Car.

ROCHESTER, N. H., December 5.

Editor HORSELESS AGE:

One of the interesting details of the Stanley steam carriage, a description of which is given in *THE HORSELESS AGE* of December 2, is the means employed to secure a steam tight opening in the float chambers for the pivot that carries the indicator wire. It is ingenious, and, I think, original. As ordinary packing would be objectionable, on account of the friction which would render the readings of the indicator uncertain, the pivot that carries the indicator hand is provided with a check valve at the place it passes through the float chamber wall, the seat of this valve being in the wall of the float chamber. This valve has only a rotary motion and offers a minimum of resistance to the oscillations of the float. As the valve is continually grinding on its seat it is always steam tight and requires no attention.

ERNEST DUVAL, M. D.

Auto Law According to an Up State Legal Light.

HERKIMER, N. Y., December 3.

Editor HORSELESS AGE:

As a sample of the antique in the current legal knowledge of our "up State" "ambulance chasers," the enclosed clipping from the *Utica Press* of this date is a fair sample, and explains itself.

A READER.

[Inclosure.]

Emma Clark, whose home is in the Theatre Block, was run down by an automobile while crossing Genesee street in front of the Arcade yesterday afternoon. The machine was going down the street and contained Operator Davis and W. H. Birdsall, of the Buckmobile Works. • • •

An attorney whose office is in the Arcade, in speaking of the accident, said: "I wonder if people know it is a misdemeanor to run an auto in the street, not alone knock anyone down. Here's what Section 640, subdivision 11, of the Penal Code says:

"A person who drives or leads along a public highway a wild and dangerous animal, or a vehicle or engine propelled by steam, except on a railroad, along a public highway, or causes or directs such animal, vehicle or engine to be so driven, led or to be made to pass, unless a person of mature age shall precede such animal, vehicle or engine by at least an eighth of a mile, carrying a red lantern if in the night time, and gives warning to all persons whom he meets traveling, of the appearance of such animal, vehicle or engine,

is guilty of a misdemeanor.' This misdemeanor is punishable by a \$500 fine, a term in the penitentiary for a year, or both. I wonder if folks know this."

Automobilist's Damage Suit Against Town Adversely Decided.

AMHERST, MASS., December 5.

Editor HORSELESS AGE:

I would like to acquaint you with the result of a trial in Greenfield yesterday before Judge Aiken, of the Superior Court, in a suit for damages I brought against the town of Orange. Briefly the facts are as follows:

On July 4, 1902, a young man with one or two years' experience at the Overman's shops, then at Chicopee, but during the

miles an hour. His horse smelled it at the same time and he was afraid it would run away. He pulled up beside the road 100 yards away and saw the auto strike the mud hole, turn to the right, hit the guard rail, stop and tremble, and then plunge down the bank. He then drove by, but did not stop, as he saw the man coming up the bank, and his horse was going 20 miles an hour.

The judge decided that my man was running very fast, and although he slowed down to 7 or 8 miles an hour, that was too fast, and the law did not require the selectmen or the town to keep the roads in such a condition that an auto could be driven safely at that rate, and so decided against me.

Have we no rights? I am a man of small



SCENE OF ACCIDENT.

summer employed by a man here as chauffeur, taking him, his wife and child out almost daily, as an accommodation to me ran my carriage from here to Orange, where some slight repairs were to be made to it. When a mile or so from the factory, in going down a hill on a State road slightly curved, he saw a large mud puddle on a level stretch just before coming to a hill or grade. He slowed down and tried to pass to the left, but was afraid to go far over that way, because there was a pile of pine posts near the road, and also a guard rail. He struck the mud hole with his right wheel; the carriage slewed around to the right, jerked the lever from his hand, broke through the guard rail, went down a 15 foot embankment and was all smashed up. The actual cost for repairs was \$106.50.

The selectmen measured the mud puddle with a crooked board and called it 3 3/4 inches when dry. I also measured it and found it to be 6 inches. A lively stable keeper of Orange swore for the town that he was driving a wild horse one-quarter of a mile from the scene of accident around a curve, and saw my carriage going at 25

means and cannot afford to fight the town, or I would carry the suit to the highest court.

C. M. HOUGHTON.

Trouble of Nuts and Screws Jarring Loose.

Editor HORSELESS AGE:

While the periodicals are replete with the fine technical points and elaborate improvements for 1904, I wish you would give space to a wail from a poor, ignorant, non-technical chap, whose only connection with the automobile business is in the forlorn role of consumer.

Last spring I bought a runabout of reliable make, and have become fairly expert in its use. The makers boast of their workmanship and the reliability of their car. I have had naught but courtesy and generosity from makers and agents. I have never detected the slightest flaw in the honesty and thoroughness of manufacture and inspection. My machine has done all that was ever claimed for it, and has shown no structural inferiority.

But—yes, but—the machine, like all

ers, is put together with bolts. These bolts are held in by nuts. These nuts, and consequently these bolts, work loose and come out, and then there is lots to pay. No matter how often they are inspected and tightened, they work loose; and, besides, a professional man cannot spend all his time on the wrench.

I early saw that the fenders worked loose and rattled on very slight provocation. I wrote to the factory and learned that I was the only customer out of I've forgotten how many thousands who ever made such a complaint. So I put a leather washer and two nuts on each bolt. No use! they rattled after 5 miles of riding and fell off after 50.

My thumb nuts on the tire lug bolts also work loose; regulating nuts on the valve stems work loose and stop me; nuts everywhere work loose and come off, and bolts fall out. One night I stopped dead at a very inopportune moment, and found after long investigation that the spark advancing outfit had become unbolted from the frame and was hanging only by the electric wires; the bolts that had held it to the frame were not only loosened, but gone. This caused me a loss of time of twenty-four valuable hours. The bolt holding the radiator onto the cylinder worked loose and has caused a hot cylinder.

Now, I am a greenhorn, but so are 80 per cent. of other consumers. If the vibration cannot be lessened—and I presume in a single cylinder machine it cannot—cannot some enterprising maker put up a wagon on which every nut is a lock nut? In the technical publications I very frequently see descriptions of lock nuts. Are they not any good? If any are efficient, why do not some manufacturers put them on? The fellow who will put on unloosenable bolts will be pretty apt to sell a 1904 wagon to me and to many other aggravated users.

AUGUSTIN A. CRANE, M. D.

Traffic Accidents in New York City.

Editor HORSELESS AGE:

I enclose herewith a clipping from the New York Evening Sun of Friday, December 4, which may have escaped your notice. The third paragraph, containing the report of fatal vehicle accidents during 1902, is the interesting feature of the article, and in view of the feeling which exists in certain quarters and which is generally voiced in a manner tending to exaggerate the capacity of automobiles for causing accidents, this paragraph deserves publicity.

PERRY B. RAWSON

[Inclosure.]

"Commissioner Greene made public today some statistics concerning violations of the speed regulations. He said that in the Third, Fourth and Fifth Inspection Districts from May 4 to November 15 of the present year there had been 240 arrests for the violation of speed regulations by all

sorts of vehicles. Of the 240 persons arrested, 102 were discharged, twenty-seven cases are still pending and the remainder were fined sums varying from \$10 to \$50, the total amount of fines reaching \$1,305.

"The commissioner said that he thought there should be a more rigid enforcement of the speed regulations and that the punishment be made greater for their violation by all vehicles.

"During the year 1902, he explained, there were 321 fatalities. Of these 144 were caused by trucks and wagons; 172 by street railways, 9 by automobiles, 2 by bicycles and 2 by runaways. The remainder have not been specifically accounted for."

Standard Threads for Automobile Work.

Editor HORSELESS AGE:

The article by Harry E. Dey in a recent number of THE HORSELESS AGE strikes me as being a move in the right direction. It is hardly possible, perhaps, that such a uniformity as we have in pipe threads can be brought about in the threads for bolts and adjustments, but it would be a great advantage if the variety of threads in common use for any given diameter could be reduced in number. Take the list given by the Mobile Company alone; they have six different threads in use for seven-eighths inch diameter, viz., 9 (United States standard), 14, 16, 18, 20, 24.

It certainly appears to me that the advantages in favor of such threads as 14 in place of 16, 18 in place of 16 or 20, 22 in place of 20 or 24, are far more imaginary than real. I have on one part of my auto a cover plate held on with screws of size No. 4x38 thread. Why any designer ever selected any such size as that I cannot see, as it is not listed by any tap and die manufacturer and no screws can be found in stock anywhere to replace them. This is, of course, an extreme case, as the threads chosen, while varying widely, can usually be matched somehow.

Where a special thread is chosen of more than 16 threads to the inch, the number may as well be made a multiple of 4, for the sake of simplicity. It should, moreover, if of 1 inch diameter or less, be of a size and thread listed in stock by the larger tap and die manufacturers. For both of these reasons the list of proposed threads appears objectionable, in having the 18 and 22 thread sizes, and the sizes 3/4x18, 3/4x16, and 1x16, which are not stock sizes in either taps or dies. I believe, however, that for 1 inch diameter 16 threads is better than 20 for fastenings, and would use it if it could be had readily.

I would suggest the following list of sizes:

For holes tapped in cast iron or aluminum, and for all complete bolts, used with lock nuts or crown and cotter pin—3/4 inch diameter and above, United States standard size and form of thread. Less than 3/4 inch diameter, V thread, No. 2x56. No.

3x48, No. 4x36, No. 6x32, No. 10x32, No. 12x24, No. 14.

For special fastenings, unions, gland nuts, etc., V thread—Sizes No. 6 to No. 12 inclusive, 32 threads; 3/4 inch to 7-16 inch, inclusive, 24 threads; 1/2 inch to 3/8 inch, inclusive, 20 threads; 1 inch and above, 20 or 16 threads.

For adjusting screws and tubing, V thread—Sizes No. 6 to No. 12, and 3/4 to 1/2, inclusive, 32 threads; 7-16 inch and above, 24 threads.

No. 14 size to be used.

I would like to have any criticism of the sizes in the above list. E. J. LORING.

Tire Sections.

Editor HORSELESS AGE:

In connection with my article in your November 4 issue, I notice Mr. Duryea takes exception to the statement made that a tire may be molded in such a shape as to retain its elliptical form after it is inflated and before the weight is placed upon it. This statement was not founded on a mere theory, but was made from observations of tires tested for this purpose.

The tire is not so flexible an object as Mr. Duryea thinks, as the rim holds one part of the circumference rigid which prevents any change of shape in this direction, the casing assumes the shape given in the mold, and the air tube that of the inner walls of the case.

The 1904 tires of Western manufacture of this type show an even more pronounced elliptical form than advocated in my article. C. WILL TRAVIS.

[Mr. Travis' sketches were redrawn in our office. We were directed to get sections of tires and take dimensions from these for the cuts, both in their natural position and under load. It seemed to us that the sectional drawings thus obtained would not be accurate, as the effect of the air pressure in an actual tire would not figure here. Consequently the sections were purposely drawn to show the effects referred to in the article on an exaggerated scale. It cannot, therefore, be claimed for the drawings that they show accurately the shape assumed by the tires.

The internal pressure on the wall of the tire is perfectly uniform over the whole surface, and if the tire cover was perfectly deformable it would assume a circular shape. The cover, however, is not perfectly flexible, and its form when the tire is inflated and under load will depend to a certain extent at least upon the form the cover has been given in the mold and upon the method of fastening in the rim.—Ed.]

In the 1904 Diamond detachable tire a swivel washer is used on the rubber covered lug, for which it is claimed that it cannot get lost when the lug is loosened to remove the tire cover, but is always in place and performs the same service as a loose washer.



Screws, Bolts, Nuts and Wrenches.

Screws and bolts are used very extensively in motor car construction, and there is hardly a repair or adjustment on a machine that does not require the loosening and tightening or the removal and replacing of a screw or nut. Hence it is very important for the automobilist to be familiar with the practical rules which should be observed in placing screws and nuts, and in removing them. Besides, it is well for him to know the technical names for the different kinds of screws and bolts most used in automobiles, as it will facilitate ordering renewals, explaining mishaps and repairs needed to a repair man, etc.

In the conventional mechanical drawings which will be used to illustrate these articles screw threads are represented by alternate light and heavy lines, repre-

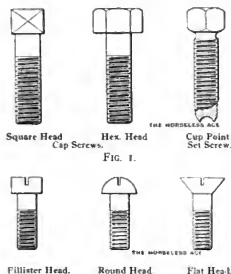
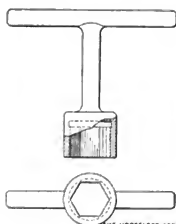


FIG. 1.—MACHINE SCREWS.

senting the top edge and the bottom line of the thread respectively. In Fig. 1 herewith are shown the two most common types of cap screws used in motor vehicle construction—the square head and the round head—and a cup pointed set screw, and in Fig. 2 are shown the three most common forms of machine screws—filler head, round head and flat (or countersunk) head. Cap screws are usually used in sizes of from one-quarter inch diameter upward, and machine screws in sizes from one-quarter inch diameter downward. Both cap screws and machine screws are used for holding two or more parts together, screwing with their threaded end into one of these parts after being passed through a hole through the other part or parts. The screw can also be passed through all of the parts to be secured together and provided with a nut,



THE HORSELESS AGE
Socket Wrench.

FIG. 3.

in which case it is called a bolt. Set screws are used to hold parts on a shaft against movement thereon, either angular or longitudinal; they are not much used in automobile construction.

In removing screws and nuts, and in putting them back in place, care must be used not to injure either the screw head, the nut or the threads. Particular care is necessary in the case of screws which, by the nature of their use, need to be removed or loosened frequently. To prevent injuring the screw head, the wrench used on the screw should be a good fit. The best form of wrench from this point of view is the socket wrench, as shown in Fig. 3, but as this wrench is of cumbersome size and can only be used on one particular size of nut or bolt head, it is rarely used—only for screws which cannot be gotten at with the ordinary wrenches.

The automobilist's tool supply should include a set of S wrenches of the 15 degree variety, which enable screws to be turned in very restricted spaces. The wrench is first put on the screw head one way and turned through its range of motion, and is then reversed, that is, is turned upside down. In this way the minimum angular motion required through which the wrench can be turned freely is 30 degrees, whereas 60 degrees would be the minimum necessary with a straight wrench. For carrying along in the toolbox, two monkey wrenches—one of the bicycle type and one larger size—are probably most convenient. For all small screws and nuts the bicycle wrench



FIG. 4.

A form of Monkey Wrench suitable for the Tool Box.



FIG. 5.

S Wrench, showing use on nut smaller than wrench is intended for.

should be used, as it is a very easy matter to strip the screw thread if a large wrench is used on small work.

The jaws of the monkey wrench must always be clamped tight to the screw head or nut, as there is naturally some spring to give to these jaws—they being separate pieces—and they are liable to slip around the piece held, wearing off the corners. After this has happened once it is much more difficult to prevent it, and frequently the head of screws which have often to be unscrewed will be transformed from a perfect hexagonal to a nearly round shape in a short time after that, and the screws are then almost impossible to remove. In case a monkey wrench is not at hand and an ordinary S wrench has to be used for screws smaller than it was intended for, it is sometimes found convenient to place a strip of metal between the screw head and one of the jaws of the wrench. If the toolbox should not contain a suitable piece of sheet or strip metal, a copper penny or nickel may answer.

When a screw or nut requires to be drawn up perfectly tight, the thread and



FIG. 6.

Removing a nut on which a wrench will not hold—A desperate method.

the base of the nut or screw head must be lubricated with oil or a graphite compound. This will reduce the friction and enable to screw the part up tight with less danger of injuring the thread or head. The lubricant will also prevent the thread from rusting, and will facilitate the removal of the screw when occasion should require it. Sometimes a screw will become firmly rusted in place and defy all attempts at removing it. A little kerosene will dissolve the rust sufficiently to enable the screw to be loosened.

Where a number of screws are used to secure cast parts together, in tightening these screws each one must be turned a little at a time, and the wrench passed from one to another; otherwise, if one of the screws is tightened up much more than the rest, a piece is easily broken out of the casting, which in such a part as an engine cylinder, for instance, may be a very serious matter. When all the screws are fairly tight, it is well to strike the piece screwed down a hammer blow while pulling on the wrench, the vibration resulting from the hammer blow al-

lowing of drawing the screw tighter without overstraining the thread.

Sometimes a screw or nut is so tight that it cannot be loosened with the wrench on hand; or the nut or screw head may be spoiled so no wrench can be applied to it. In such a case, if the nut or screw must be removed, the only method available is that illustrated in Fig. 6, which consists in applying a cold chisel to the screw head in such a manner that when struck with a hammer it tends to unscrew the screw, and striking it. This method of procedure must be regarded as a last resort. In the next installment means for locking screws and nuts against unscrewing will be described.

Steam Engines.

(Abstract from a Lecture by Parker H. Kemble before the Boston Y. M. C. A.)

Steam can be used in an engine either with expansion or without expansion. Where the steam is expanded in a single cylinder and then exhausted the engine is called a simple engine. No matter how many cylinders you place side by side it remains a simple engine as long as each cylinder gets its separate steam supply independent of the others. If two cylinders are used it is called a double engine, and in that form is familiar as the usual engine on light cars.

High steam pressure conduces to fuel economy and, besides, has this other advantage: If you need only partly fill the cylinder with steam at each stroke of the engine a smaller boiler will do the work, and if the pressure be still further increased a smaller piston and cylinder will develop the same power. In order to get a better insight into the relation between pressure and size of the cylinder we will take up the formula for horse power. The formula, as applied to engines, is

$$I. H. P. = \frac{2 \text{ PLAN}}{33,000}$$

where P = mean pressure on the piston, A = area of piston, L = length of stroke in feet and N = number of revolutions per minute. Now if the pressure P be doubled the power will be doubled; if the area of the piston A be halved the power will be halved; if the pressure be doubled and the piston area halved the power remains the same, but the engine is smaller and lighter, as is the boiler.

If the steam pressure is raised much above the point required to actually do the work the exhaust or terminal pressure will be unnecessarily high, and waste will ensue. In cases where economy of weight and space are the greatest factors this is accepted as the price of compactness and light weight. In large engines, however, where the amount of fuel and water consumed is large, and especially where all supplies have to be carried along, a point is soon reached where the amount of water and fuel used begins to count

WATER ECONOMY.

In the first light steam runabouts stops for water every 15 or 20 miles were accepted as a matter of course, and until very recently simple engines running at high pressures and exhausting at a pressure far higher than was carried in the earlier steam boilers were the only type in use. The inconvenience of having to water up every few miles and the weight of the water tank and its contents became, as we grew more exacting with experience, a serious drawback to steam as a driving power. Three ways out of the difficulty were possible: Superheating, which made the steam more effective; compounding the engine, which saved the loss of a part of it from the high exhaust pressure, and the use of the condenser, which enabled the water to be used over again. The first and second methods helped the fuel supply, and the third the water tank.

COMPOUNDING.

In a simple engine with a load of 10 pounds on the piston a terminal pressure of 10 pounds is necessary to complete the stroke. Now suppose the boiler pressure to be raised to a point where the terminal or exhaust pressure became 20 pounds, and that another cylinder were to take this steam and expand it down to 10 pounds in lifting another weight; then the exhaust from the first cylinder would not have been wasted and we would have twice the power from the same amount of steam. From the formula for horse power it will be seen that two cylinders of equal size but with different pressures would be given different powers, and as compound engines generally work together on the same shaft, structural as well as economic reasons demand a balance of power. The only way to obtain this, as the pressures are fixed, is either to make the high pressure cylinder smaller and the low pressure larger. In designing a compound to take the place of a simple engine both alterations are usually made.

While superheating is not as effective with a compound as with a simple engine, it is of sufficient importance even with a compound to be highly desirable. The condenser probably makes the greatest showing of the three methods and is more effective with the compound than with the simple engine. It is rather hard to get any reliable data on the surface required in an air condenser such as used on motor cars, but probably .5 to .6 horse power per square foot of surface is as much as could be relied upon even under favorable conditions.

ATTENDANT DIFFICULTIES.

Superheated steam, compound engines and condensers are not unmixed blessings by any means. Superheated steam means a careful choice of lubricating oil and liability of trouble with packing. Compound engines, while having the same number of cylinders as the twin or double engine, present the complication of sim-

pling valves. These are used to turn a compound engine into two simple engines at starting or when extra power is required. Their function is to let boiler steam direct into the low pressure cylinder, and to direct the high pressure exhaust into the air or condenser instead of passing it through the low pressure cylinder. Condensers mean extra pumps to handle the condensed water, and grease filters to clean out cylinder oil and keep it out of the boiler. However, each and all of these are well worth the added complication, and no car intended for more than purely local use should be without them.

CONDENSER CONSTRUCTION.

Condensers serve the opposite function as steam boilers. While that of the boiler is to supply heat to the water and turn the water into steam, the function of the condenser is to take steam and turn it back into water. As there is little or no pressure to be taken into consideration, the construction of a condenser is much simplified. The condenser can be made in many forms, the simplest being a series of coils of very thin brass or copper pipe so placed as to be in a current of cool air, through which the steam passes after leaving the engine.

SINGLE AND DOUBLE ACTING ENGINES.

In single acting engines the steam exerts its force only on one side of the piston. In double acting engines first one side and then the other is acted upon by the steam. A single acting engine only gives one-half of the power of a double acting engine of the same size under similar conditions. It has, however, advantages which entitle it to a more general use than it has at present attained.

One of the worst nuisances in a steam carriage is the necessity of packing around the piston rod, which is usually inaccessible and always hot—and scalding hot—when needing adjustment.

In this single acting engine piston rod, piston rod packing and guides are all done away with, and the steam engine assumes its simplest form. Owing to the saving in weight, due to the absence of these parts and to the shorter frame required, two single acting cylinders developing the same power as one double acting will weigh much less than twice the latter. Another advantage, and an important one, is that, the pressure always being in the same direction, there is no tendency for crank and wristpin braces to leave the pins, and the bearings may be worn to an extent that would in a double acting engine result in a disagreeable noise.

To take the place of the usual runabout twin cylinder engine four single acting cylinders would be needed. They would take up more room lengthways, but less in height. They would have more valve gear and more main bearings, but would stand more abuse than their rival. Double acting engines are at present the standard

and well deserve to be, as a more compact and powerful little engine than the present type of twin cylinder engine would be hard to find. Compound engines can be built single acting as well as double acting.

VALVES.

The only valves in general use in motor car work today are the slide valve and piston valve for double acting and the poppet or mushroom valve for single acting engines. The former is driven by what is called the Stevenson link motion and the mushroom valve by a cam and cam shaft gear, similar to that used in gas engine practice.

In designing an engine for a motor car after the general type has been decided upon, the best proportions of bore to stroke and the question of pressure and piston speed have to be considered. The relation these bear to one another can best be learned by a careful study of the horse power formula given above. It should be borne in mind, however, that in these small engines, when double acting, 750, and, when single acting, 1,200 revolutions per minute are probably the safe limits for continuous working; that in high speed engines the stroke should not be much greater than the bore, and that pressures over 350 pounds steady will bring trouble of their own.

TRANSMISSIONS.

The transmission of power from the engine to the driving axle is either by chain, by shaft with bevel gear or by direct gearing. If only ideal conditions had to be taken into consideration I should rank chain first, then direct gear and bevel gear drive last. But in actual practice the impossibility of protecting the chain from dust and grit places it at the end of the list. As regards the other two the location of the engine decides, and that in its turn is greatly influenced by the style of body and fashion of the day. Personally the convenience of access to an engine placed in front would make up for any slight loss of power in the extra gearing.

All pistons should be provided with piston rings, as a plug or solid piston cannot be depended on to stay tight. There should be at least two to each piston.

Houston Races.

One of the first automobile races in the State of Texas was held at Houston on Tuesday, November 24. Following is a summary of these races, furnished us by the organizing committee—G. W. Hawkins, M. J. Lossing and S. H. Hart:

Five Miles, for Light Machines, Stripped—Cadillac, driven by Mr. Hurlbut, winner; time, 9:10½. Cleveland roadster, driven by C. W. Fletcher, second. An Oldsmobile, driven by A. J. Saliers, ran over a dog in the first lap and bent an axle, which threw it out of the race.

Five Mile Race, for Stock Machines of

1,500 pounds and under, with body on—Four entries: a Cadillac, a Richard-Brazier and two Oldsmobiles. The Brazier and Cadillac were allowed to run stripped. The race was won by the Cadillac in 9:21. The Oldsmobile, driven by Louis Birdsong, made second best time—9:36.

Five Mile Race, Free to All—J. D. Anderson, Richard-Brazier, winner; time, 9:34. Louis Birdsong, Oldsmobile, second.

Three Miles, for Steamers—Ed Conner, Mobile, winner; C. Erickson, Conrad, second.

Australian Pursuit Race—J. D. Anderson, Richard-Brazier, winner; Louis Birdsong, Oldsmobile, second.

A New Trackless Trolley System.

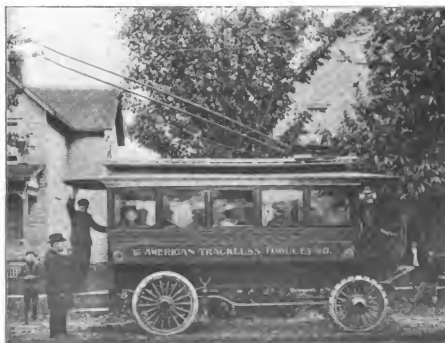
The two illustrations herewith show a trackless trolley car in operation near Scranton, Pa., which was built under the patents of the Trackless Trolley Company, of Boston, Mass. The car will be seen to be of the motor 'bus type, with a seat for the driver or motor man in front and a car platform in the rear. It has a tubular running gear and rubber tired wheels. The special feature of the system is the trolley construction, on which patents have been granted to A. B. Upham, the president of the company. The overhead construction comprises two parallel wires, one for leading the current to the car and one for the return circuit. On the top of the car are mounted two trolley poles which carry at their outer ends each a trolley wheel arranged horizontally and bearing against the respective trolley wires sidewise. The trolley wheels are forced against the wires



FRONT VIEW OF TRACKLESS TROLLEY BUS.

by means of springs at the base of the trolley poles. This arrangement of the trolleys allows the car to turn out 15 feet to either side of the road to let other vehicles pass.

It is claimed that experience with trackless trolley vehicles in Germany has proven that snow is less of an obstruction to trackless trolley cars than to cars running on rails. Regarding cost of installations on this system it is stated that putting up the trolleys and supports costs about \$1,600 per mile, and a car to carry thirty passengers seated and twenty standing will cost complete \$2,600.



SIDE VIEW OF TRACKLESS TROLLEY CAR.

The Meserole Double Cylinder Gasoline Engine.

An opposed cylinder gasoline engine is being placed upon the market by the Meserole Manufacturing Company, of New York city. The engine, of 10 brake horse power, water cooled type, is a departure from conventional design in this type of engine, in that its valves are set in a vertical position, which is claimed to insure their perfect seating. The liability of side wear on the valve stem guides is reduced by making these guides of great length and providing the valve ends with cam rollers (not shown in the drawing).

The cam shaft is driven by a pair of spiral gears of very large diameter, which

making adjustments to take up wear without disturbing the working parts or necessitating working upon the entire crank case.

The cylinder heads are cast integral with the cylinders, avoiding all possibility of leakage from the jacket into the cylinder. The connecting rods are of I section and made of bronze with boxes of brass. All working parts are said to be readily accessible.

The New Crest Factory.

The new factory of the Crest Automobile Company is located on the banks of the Charles River in Cambridge, Mass. It is a single story building with a two story head

plete cars. Frank B. Crockett is factory superintendent and George C. Beckwith chief draughtsman.

Panhard Branch in New York.

A. Massenet, general manager, and A. de Magnin, assistant manager, have recently opened an American branch of Panhard & Levassor, of Paris, at 230 and 232 West Thirteenth street, New York city, in a three story and basement building 50x50 feet. The basement is fitted with testing blocks for testing auto boat motors, and contains a wash stand and a sort of repair pit. An opening is cut in the floor of the lift, and by running a car on to the lift and slightly lowering the latter, it serves the purpose of a pit very well.

The first floor is devoted to general repairs, and the second contains a suite of offices and a stock room, while the third floor is taken up by a machine shop. An option has been secured on a building in the rear, which will be occupied should business demand it. The object of the Panhard firm in establishing a branch in this country is said to be not to sell cars, but to give information to users of Panhard cars and to do repair work. It is claimed that it has been impossible heretofore to get repairs to Panhard cars done properly in this country.

Trade Literature Received.

The Boston Gear Works, Boston, Mass.—Circulars describing the universal joints and the worm and worm gear sectors for steering device made by this firm.

Oliver Manufacturing Company, 203 South Desplaines street, Chicago, Ill.—Catalogue of jacks.

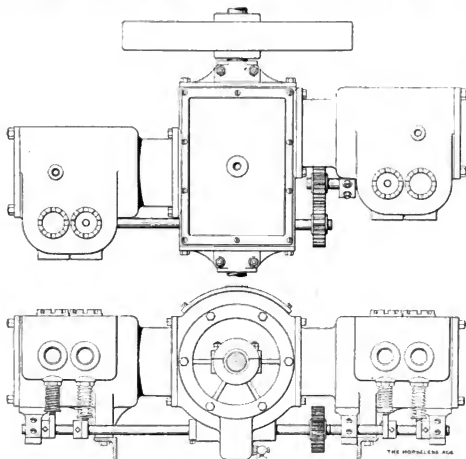
The Stodder Tire Company, 90 and 92 West Broadway, New York city.—Catalogue and price list of the Stodder pneumatic tires.

G. H. Curtiss Manufacturing Company, of Hammondsport, N. Y.—Advance circular of the Hercules motor cycles and parts for 1904.

John Turf's Sons' Iron Works, 534 and 536 West Twenty-eighth street, New York city.—Catalogue of tanks, smoke stacks, cars and industrial railways.

N. A. A. M. Awards Medals.

At the December meeting of the association, held on December 2, gold medals were awarded to the owners of the cars in the recent New York-Pittsburg Endurance Run that made every control on schedule time, as follows: White, No. 5, operated by Webb Jay; White, No. 6, operated by Paul Deming; Pierce, No. 15, operated by Percy Pierce; Arrow, No. 14, operated by C. L. Sheppy; Toledo, No. 10, operated by George Soules; Packard, No. 16, operated by E. P. Fetch, and Stearns, No. 35, operated by F. P. Stearns. An extra medal was awarded to the Columbia No. 2.



MESEROLE GASOLINE ENGINE.

are enclosed within the crank casing. The lower one of these gears is located within a pocket in this casing, and is submerged in oil, which assists the lubrication of the enclosed parts. The cam shaft is broken, one part of it being offset to permit the valve chambers of both cylinders to occupy the same relative position to the cylinders, assuring an equal compression in both. The two parts of the cam shaft are in driving connection through a pair of outside spur gears.

The main bearings of the engine are said to be of generous bearing surface. The lower half of these bearings is cast together with the crank case head, and the upper half is removable, which admits of

house in front, comprising 55,000 square feet of floor space. The machine shop occupies a room 50x150 feet, which also includes the stock room. The works also include departments for trimming and up-holstering, body finishing, forge and brazing work, stripping and repair work. The testing department is equipped with a Prony brake for testing high speed motors, on which every motor is tested with its actual carburetor.

The machine tools are driven by electric motors, and the power equipment is so laid out that each department is independent of all the others. An auxiliary steam plant is provided for emergencies. On the second floor there is a large stock room for com-

OUR FOREIGN EXCHANGES.



A Self Starting Reversible Kerosene Engine.

In a recent issue of *Engineering*, London, is described a power launch for the Uganda (East Africa) Railway, built by Messrs. Thornycroft, the English launch and motor vehicle builders. The launch is fitted with a 10 horse power Berthieu self starting, reversible kerosene engine. The fact that Messrs. Thornycroft still use gasoline engines for their pleasure automobiles may be regarded as proof that the disadvantages of this engine for motor car purposes still preclude its use in that line, but a self starting, reversible, portable kerosene engine is certainly enough of a novelty to interest gasoline engine designers, especially when it has the degree of practicability which is guaranteed by its use by a firm of the reputation of Thornycrofts.

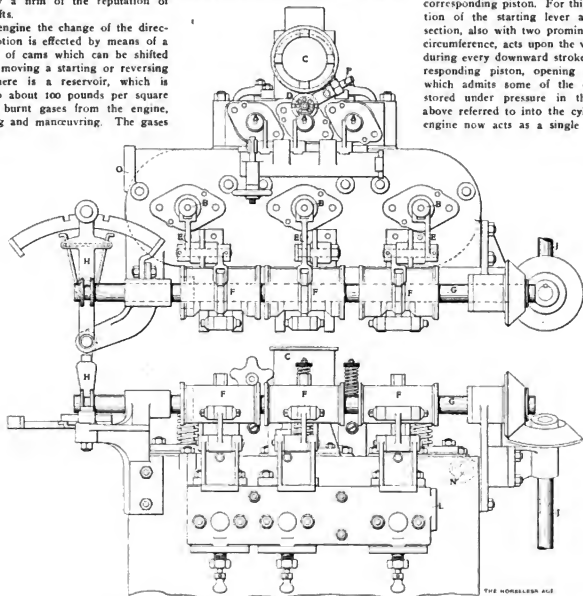
In this engine the change of the direction of motion is effected by means of a double set of cams which can be shifted by simply moving a starting or reversing lever. There is a reservoir, which is charged to about 100 pounds per square inch with burnt gases from the engine, for starting and manœuvring. The gases

are admitted to the reservoir from the engine cylinder through a relief valve, the pressure being slightly below that of explosion. When the reservoir needs replenishing, communication is opened between it and the cylinder for a few revolutions; and on the required pressure being reached the communication is shut off.

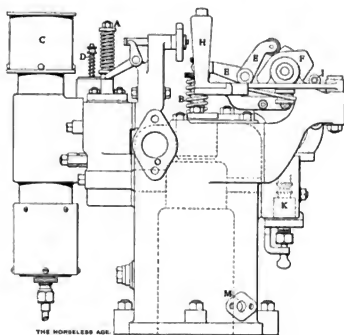
The engine is a three cylinder upright one and works normally as a four cycle engine with automatic air inlet valves A and mechanically operated exhaust valves B located in the head of the cylinders. The kerosene is vaporized in a vaporizer C which is heated by a lamp serving at the same time for heating the ignition tubes. The use of hot tube ignition reduces somewhat the complication connected with making an engine reversible where electric ignition is used. The kerosene vapor is admitted to a mixing chamber through the mixing valves D. The exhaust valves are operated through levers E from cams F on the cam shaft G running across the top of the cylinders at one

side thereof. This cam shaft is driven from the engine crank shaft through two pairs of bevel gears and an intermediate shaft J at one-half the speed of rotation of the crank shaft.

The cams F consist each of a number of distinct cam sections, and the cam shaft G can be moved in the direction of its axis, by means of the starting lever H, into five different positions, thereby bringing different cam sections in line with the exhaust valve levers E. The central position of the starting lever is the "at rest" position. The intermediate positions correspond to normal operation of the engine forward and backward, respectively. The cam sections then opposite the exhaust valve levers E have each one prominence, and the exhaust valve is opened once for every two revolutions of the engine. When the starting lever is in either of its extreme positions, a cam section which has two equal prominences on its circumference acts upon the exhaust valve levers E and causes the exhaust valves to open during every upward stroke of the corresponding piston. For this same position of the starting lever another cam section, also with two prominences on its circumference, acts upon the valve lever I during every downward stroke of the corresponding piston, opening a valve K, which admits some of the exhaust gas stored under pressure in the reservoir above referred to into the cylinder. The engine now acts as a single acting fluid



PLAN VIEW AND ELEVATION OF VALVE MECHANISM OF THE BERTHEAU KEROSENE ENGINE.



SIDE ELEVATION OF VALVE MECHANISM.

pressure or steam engine, every downward stroke of each piston being a power stroke, and every upward stroke an exhaust stroke. As the pressure in the cylinders never gets below atmospheric, the automatic inlet valves remain closed. The engine, of course, is worked in this way only momentarily, to get up speed, when the starting lever is moved to bring one of the intermediate cam sections under the roller of the exhaust valve levers, and the engine begins to operate as a regular four cycle explosion motor. With three cylinders, and a power stroke in each during each revolution, there is, of course, no dead point, and the engine will start under load in either direction from any position.

In the drawings L is the flange for the pipe connections carrying the stored gases to the engine; M is the cooling water inlet; N the cooling water outlet; O the flange for the exhaust pipe connection, and P the kerosene inlet to vaporizer.

The New English Motor Law.

It is not anticipated that the new act which comes into force on January 1 next will in any way injure the trade. Several important points have been modified or altered, and motorists have now far less to complain of. Two number plates must be carried (one of which shall be illuminated after dusk), and these may be placed where the owner pleases, subject to the council's approval. The size of the number plate has been reduced and the size of the letters and figures will be $2\frac{1}{2}$ inches wide by $3\frac{1}{2}$ inches high, with the signs in white on a black background.

It is now possible for a motorist to find his own plate, and many will avail themselves of this, no doubt providing some-

thing more artistic than that furnished by the authorities.

In a circular letter issued to the councils it is pointed out that cars, etc., will in future be easily identified, and it recommends local authorities to refrain from applying restrictions which will not only be particularly troublesome to motorists but awkward and expensive to carry out.

At a meeting of the De Rijwel-en-Automobilindustrie, the Dutch motoring club, it was resolved that another motor car show should be organized at Amsterdam in the spring of next year, and a committee, under the presidency of J. Leonard Lang, was formed to take all necessary steps. M. P. Scheltema-Beduin will act as secretary.

Stanley and National Show Exhibits.

In reference to the Stanley and National shows which opened recently, our London representative writes: "It is evident on every hand that manufacturers realize that the 'man of moderate means' is well worth studying, and nearly all the exhibits in the motor section give evidence of greater attention to small cars than they have received in the past. In motor cycles great mechanical and structural headway is apparent, and, although the 3 horse power motor cycle is a feature of many exhibits, it is obvious that the lesser powered machines are as prominent and popular as ever. A striking difference is noticeable in the tone of the manufacturers as compared with a year ago, when delivery at anything approaching an early date was a concession; this year nearly all firms can deliver immediately. A distinct fall in prices and greatly increased production are noticeable. Generally speaking, good business has been done, though complaints are to be heard from some exhibitors."

Club Notes.



Massachusetts Clubs' Meeting.

At the invitation of the president and secretary of the American Automobile Association, seven automobile clubs in Massachusetts sent representatives to the meeting on Saturday, December 5. The following were present: Col. James T. Soutter, Massachusetts A. C.; W. E. Eldridge, Boston Dealers' Association; Asa Goddard, Worcester A. C.; H. E. Shiland, Worcester A. C.; Franklin Weston, Berkshire A. C.; M. Burke, Marlboro A. C.; L. H. Greenwood, Wauchoos A. C.; W. H. Marble, Brockton A. C.; Julian A. Chase, president of A. A. A.; C. H. Gillette, secretary A. A. A.

Dr. Chase and Mr. Gillette outlined a plan for forming a State association of automobile clubs, which, through the individual members becoming members of the American Automobile Association, would become affiliated with that national organization. The plan as outlined was similar to that recently used in forming the New York State Association, which has just been successfully completed. This plan, as submitted to the representatives present, is briefly as follows:

To form an association of clubs and individuals under the name "Massachusetts State Automobile Association." The board of directors to be made up of one member from each club, to be appointed by the club. Each club to agree to become a member of the American Automobile Association and pay thereto an entrance fee of \$10 and annual dues of \$1 per annum for each member of the club. The American Automobile Association to agree to turn over one-half of each entrance fee and one-half of the annual dues to the treasurer of the State Association, thereby providing it with a working capital to carry on the local legislative and good roads work.

The State association is to have a president, vice president and secretary-treasurer, a committee on legislation, the chairman of which will be a member of the board of directors and the remainder of the committee made up of prominent individuals from various parts of the State, who will be influential in securing just legislation; a good roads committee, the chairman of which will be a member of the board of directors and the remainder of the committee made up of the chairman of the good roads committees of each club, and a membership committee to be made up similar to the legislation committee.

In the discussion which followed the plan was fully approved by the representatives present, each one of whom agreed to take the matter up with his club and secure an early date official action thereon.

It was agreed that Mr. Gillette should

draw up a constitution modeled after that of the A. A. A. and the New York State Association and submit it, together with this report to every automobile club in Massachusetts. The seven clubs represented at the meeting agreed upon the receipt of this information to take the matter up with their governing bodies and appoint a delegate to a meeting to be held prior to the 1st of January, which delegate, in the event of the constitution being ratified, is to become a director in the State Association, which board of directors thus formed will elect officers, appoint committees and complete the organization.

It was decided that in order to do the most good in the way of legislation it would be necessary for the organization to be completed by the first of the year, and the clubs represented at the meeting agreed to take action at once in order that the meeting of delegates can be called at an early date.

Mr. Gillette requested an opinion from the representatives present as to how, in the event of their forming the association, a plan would be received by their clubs whereby each club would extend its privileges to tourists who are members of any other club belonging to the American Automobile Association. Colonel Soutter, of the Massachusetts Club, advised that his club has already considered.

A. C. OF BUFFALO.

At a meeting on December 1 a new membership committee was elected as follows: Fred J. Wagner, chairman; George T. Robinson, J. B. Eccleston, A. H. Knoll, J. A. Cramer and H. E. Crouch.

COLORADO A. C.

President D. W. Burton and Secretary J. H. Bergtold, of the Colorado Automobile Club, of Denver, have petitioned the city council that the money now spent on sprinkling be expended on cleaning the pavements, alleging that if the streets are thoroughly cleaned sprinkling is unnecessary.

A. C. OF CALIFORNIA.

The club is said to be in a quandary as to what use it is best to put the profits from the recent races. A garage or a club house is said to be among the possibilities; but President Johnson is quoted as saying that it is more likely that they will be applied to some good roads movement, so that both automobilists and the public may participate in the benefit. The profits were between \$4,000 and \$5,000.

LONG ISLAND A. C.

The nominating committee of the Long Island Automobile Club, of Brooklyn, N. Y., has reported to the board of governors the following names for election at the annual meeting on December 9: President, Frank G. Webb; vice president, Albert Wilmarth; secretary, H. P. Hanaford; treasurer, Edwin Melvin. Board of governors—J. Adolph Mollenhauer, A. B. Fardington, Lawrence Abraham, Louis R. Adams, Frank G. Webb, H. P. Hanaford,

Edwin Melvin. After the election there will be served the third annual dinner, which will be followed by a vaudeville entertainment.

MASSACHUSETTS A. C.

The nominating committee of the Massachusetts Automobile Club has posted the following nominations for officers: President, Eliot C. Lee; first vice president, Frank E. Peabody; second vice president, Joseph C. Stedman; treasurer, Royal R. Sheldon; secretary, Frederick Tudor, Jr. Executive committee—James T. Soutter, F. L. D. Rust, Arthur W. Stedman, Winfield S. Shrigley, Henry Howard, William A. Rolfe, Otto B. Cole, Stephen W. Sleeper, F. Lothrop Ames and Quincy A. Shaw. Election committee—C. Frederic Lyman, Hobart Ames and Charles Hayden. By this report the executive committee is reduced from fifteen to ten members. The ticket

ble assessment of \$5 should the conditions require. The meetings of the club are held in the rooms of the Board of Trade, Newark. The secretary of the club is William A. Stimpson, 459 High street, Newark, N. J.

A. C. A.

There is said to be a division of opinion among the officials of the A. C. A. regarding the proposed changes in the rules of the Gordon Bennett Cup race made by the German Automobile Club—that the minimum length of the course be reduced from 150 to 125 kilometres and that professional drivers be allowed to drive the cars. Alexander Winton and L. P. Mooers have offered to enter cars under condition that they be allowed to assign professional drivers. Acceptance of these entries will be withheld until after the convention in Paris on December 17 to settle these questions regarding changes in the rules.



THE NEW PACKARD FOUR CYLINDER CAR.

will be voted upon at the annual meeting December 12.

NEW JERSEY A. AND M. C.

The New Jersey Automobile and Motor Club, of Newark, N. J., is sending out a circular inviting to membership. In this circular it is stated that while this organization will direct its influence to secure rational legislation governing motor vehicles, and to encourage the construction and maintenance of good roads, its primary object is to lawfully defend its members against persecution, and thereby establish their rights upon the highways. It is claimed that all automobiles need this protection and cannot economically get it unsupported by an organization. There are now 4,100 registered automobilists in the State of New Jersey, and the Automobile and Motor Club wants all of them to join the ranks. The dues will be \$10 per year, payable semi-annually, with a possi-

Test Run of the New Packard Car.

The photo herewith shows the new model "L" Packard car after its fourth testing trip, a journey of 670 miles, to Chicago and return. This new car has been subjected to some of the most severe tests possible.

From Chicago to Detroit was made after very severe rainstorms and with the mud and water varying in depth from 2 to 18 inches in some places. The picture testifies to the road conditions over which the car was operated. It is stated that throughout this fourth trial trip absolutely no repairs or adjustments were made to any portion of the motor, carburetor, electrical device or transmission. Several punctures were experienced; nevertheless, the 345 miles from Detroit to Chicago just prior to the heavy rains were made in a running time of nineteen and one-quarter hours.



The Reliance Gas Engine Company, Detroit, Mich., are about to bring out a new carburetor.

Prices on the 1904 Ford cars have been advanced to \$800 as runabout and \$900 with tonneau.

The J. H. Dawson Machine Company, Chicago, are placing on the market a light gasoline machine.

Kite Brothers are reported about to engage in the manufacture of automobiles at Fort Scott, Kan.

A. J. Coburn has secured the Boston agency for the Cameron gasoline runabout, made at Pawtucket, R. I.

The Chicago Motor Vehicle Company are reorganizing under the name of the Monarch Motor Vehicle Company.

The Light Manufacturing and Foundry Company is the new name of the Light Cycle Company, Pottstown, Pa.

The Automobile Equipment Company, Detroit, Mich., has changed hands, Messrs. Fisher and Chapin having sold out their interest.

McClure & Buchner, Chicago, Ill., are bringing out a 4 horse power gasoline motor for automobiles. A feature will be the governor.

The Commercial Motor Vehicle Company, of Detroit, Mich., have taken a contract to supply sixty electric buses for the St. Louis Exposition.

The Springer Motor Vehicle Company, New York city, are building twenty small delivery wagons, a heavy truck and a small and a large touring car. At the New York Show they will exhibit the large touring car only.

The Miller-Mundy Motor Car Company, Utica, N. Y., have opened a new showroom corner John and Catherine streets, retaining their uptown garage for summer use. They handle the Winton, Pierce, Autocar, Rambler and Columbia.

The Chicago office of the Electric Vehicle Company has closed a contract with the Anheuser-Busch Brewing Company, St. Louis, Mo., for a number of electric vehicles, to be used in conveying guests of the company to the Fair grounds.

Charles J. Glidden, of Lowell, Mass., is planning an auto trip around the world. He expects to start about August or September, 1904, going east and covering Southern Europe, parts of Northern Africa and Southern Asia, including India and China.

Gray & Davis, lamp makers, of Amesbury, Mass., recently shipped a carload of their lamps to the Winton Motor Carriage Company. They believe this to be the first time lamps shipped to an automobile manufacturer in such bulk and think it worthy of mention as an indication of

the growth of the automobile trade in general and their own business in particular.

At the last meeting of the Automobile Club of France Sidney Dillon Ripley and Louis Sherry, of New York, were admitted to membership.

The Victor Auto Storage Company has bought out the Murray Hill Auto Station, 27 East Thirty-fifth street, New York, and will conduct it under the same name.

An offer is reported to have been made to the Ford Motor Works, of Detroit, to locate at Dearborn, Mich. It includes 12 acres of land and \$4,000 in cash.

Representatives of Eastern tire factories are reported to have been calling on Western automobile manufacturers to interest them in the establishment of a tire factory at Detroit, Mich.

We have received from M. Georges Kellner, of the firm of Kellner & Cie, carriage builders, Paris, a pamphlet on "Chassis for Vehicles with Side Entrance," reprinted from *La Locomotion*.

A gasoline runabout with an 8 horse power vertical motor and sliding gear transmission is being built by C. J. Costelle and N. M. Benson, of Chicago, at the Hodge Iron Works, at Hancock, Mich. The car will be known as the La Pointe Simplex.

Henry S. MacPherson has been appointed receiver for the Boston Auto Express Company, Boston, Mass., a concern which undertook to perform express service by means of electric automobiles. The company was a Maine corporation, with \$250,000 capital stock.

The Rainier Company, of New York city, has just closed a contract with the Anheuser-Busch Brewing Company, St. Louis, Mo., for twenty 5 ton Vehicle Equipment Company's trucks. The Anheuser-Busch Company have had two of these trucks in use for a year.

The committee in charge of the show of the Boston automobile dealers, to be held in Symphony Hall next March, has given the use of one of its rooms to the Y. M. C. A. for the exhibition of the work and drawings of its automobile class. The committee announces the allotment of all the space in the main hall.

Clodio & Widmayer, New York, have been appointed American brokers for the Cudell Motor Company, Aix-la-Chapelle Germany. They also have the United States agency for the Adler motor car, made in Frankfort-on-the-Main, Germany. They will locate a salesroom, garage and repair shop within the next week or two.

The H. H. Franklin Manufacturing Company has lodged a protest against the competing of the Stevens-Duryea racer in event No. 2, in the Eagle Rock Hill Climbing Contest, on the ground that it was not eligible to the class. We are informed by an official of the contest that the protest will probably be sustained by the referee, which would leave the Franklin the winner.

GOOD RULES

To Observe in Laying Up Automobiles for Winter.

If the devil finds mischief for idle hands to do, the devil could not find anything worse than rust for idle automobiles, and Science and Practice have never found a better preventative for rust than Dixon's Graphite.

Chains should be removed and dipped in Dixon's Graphite Compound heated to about 180°.

All threaded joints should be treated with Dixon's Graphite Pipe Joint Mixture.

All small working parts should be smeared with Dixon's Graphite Oil.

And pistons and walls of cylinders should have Dixon's No. 635 Graphite thoroughly rubbed into their pores.

If all this is done, so far as rust is concerned, the machine will be as good as new in the Spring, ready to run or sell.

SEND FOR BOOKLET 36 G.

JOSEPH DIXON CRUCIBLE CO.
JERSEY CITY, N. J.

THE HORSELESS AGE

...EVERY WEDNESDAY...

Devoted to
Motor
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COMMUNICATIONS.—The Editor will be pleased to receive communications on trade topics from any authentic source. The correspondent's name should in all cases be given as an evidence of good faith, but will not be published if specially requested.

☞ One week's notice required for change of advertisements.

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A. C. A. Favors Professional Drivers for Gordon Bennett Race.

At a meeting of the A. C. A. board of governors on Friday last it was decided to instruct the club's delegate to the meeting which convened in Paris on the 15th inst. to support the change in the rules for the Gordon Bennett race proposed by the German Automobile Club, allowing cars to be driven in the race by persons not full members of the club they represent. The club's stand with regard to the other proposed change, to reduce the minimum length of the course from 150 kilometres to 125 kilometres, in order to make the Saalburg course eligible, was left to the option of the club's delegate. It appears that this change had in reality been already agreed upon and simply needed formal ratification, for the Saalburg course had already been definitely selected by the German Automobile Club on November 28.

Disagreement had been expected between the members of the board of governors regarding the question of drivers. It is known that one or two American manufacturers will enter machines only on condition that they may be operated by professional drivers. Whether the A. C. A. will be represented in the coming race will therefore depend largely upon whether professional drivers will be allowed to drive the cars—that is, whether either the convention decides that the drivers need not be members of the competing clubs or the A. C. A. decides to admit professional drivers to membership. The instructions given by the board of governors to the club delegate may therefore have some bearing on the club's future policy regarding membership. The proposed changes in the rules of the race as understood at the A. C. A. would allow machines to be entered by any member of the club, who could, if he wanted, provide a professional driver to operate the machine in the race, without the necessity of the driver being in any way connected with the club. According to

another report the proposal of the German Automobile Club is to make the professional drivers nominal members of the respective clubs.

There is little doubt that this change in the rules will be adopted, as it will remove any disadvantages in the selection of drivers one club might have as compared with another by reason of its ultra-exclusiveness. The German Automobile Club claims that its existence depends upon maintaining its exclusive character. The French club seems to be less particular in the selection of its members. The A. C. A. also, it appears, is pervaded by a spirit of democracy, though probably the decision of the board of governors with regard to the question of drivers was prompted more by the desire to see the American industry well represented in the race in Germany next year than by any other consideration.

The Value of Second Hand Cars.

The New York Herald of last Sunday contained an article of some interest on the trade in second hand automobiles. The article brings out the fact that there is a steady demand for such machines, and that the prices obtained for them depend upon age, condition, style and demand. It is stated that of the estimated 2,500 to 3,000 autos sold second hand by New York dealers annually about two-thirds are of home manufacture and one-third foreign. This proportion of foreign cars among the second hand machines may seem extraordinarily large, particularly when it is considered that the cars imported into this country do not amount to 5 per cent. of the number of cars manufactured here, and would seem to indicate that owners of foreign machines find it advantageous to dispose of them much sooner than owners of domestic machines. However, the disproportion is probably explained by the fact that owners of foreign cars sell their machines more generally through agencies than do owners of

domestic cars, and that such owners are more numerous in New York.

The writer of the article also concludes, from figures he has gathered, that American machines of the touring type depreciate much more rapidly than foreign built touring cars. This is hardly borne out, however, by a list quoted of prices obtained in recent sales. This list enumerates the sales of fifteen foreign built touring cars, the original prices of which ranged from \$4,000 to \$18,000. These cars were sold second hand at reductions of from 25 to 77.7 per cent. from their original prices, the average being almost exactly 50 per cent. The list also gives the figures for twelve American built gasoline cars, the original prices of which varied between \$750 and \$2,500. These were sold at reductions of from 31 to 87.5 per cent. of their original prices, and the average reduction was a little less than 53 per cent. It will thus be seen that in this respect there is little difference between cars of domestic and foreign origin.

The prices obtained for the second hand cars may seem low, but it should be considered that the list included some built as far back as 1900, which consequently had seen a lot of service and had become rather antiquated.

The Amateur Builder.

In our last issue appeared a letter from an automobilist who stated that he intended to build a machine for himself from parts purchased in the market, and thought he could improve on the stock machines now offered by the manufacturers. Since then our correspondent has received quite a number of suggestions from more or less interested parties as to how he could accomplish his object, and some criticism has been passed on our replies to his questions. Our statement that it would be impossible to build an 8 horse power car from stock parts, to weigh not over 800 pounds and to meet all the requirements our correspondent makes, is particularly objected to.

The proportion of one horse power per 100 pounds of car weight is undoubtedly attainable in this size of machine, for with tool steel, aluminum and sheet metal remarkable results may be achieved in the way of cutting weight. But it is, nevertheless, a fact that this "ability" is not attained in well known foreign light cars with high speed engines, like the De Dion 6 horse power. It is true that with a two cylinder engine some weight can be saved here, but, on the other hand, an amateur builder who

has to select his parts from among those offered in the market cannot shave the weight nearly so fine as can be done when every part is specially designed to be of equal strength with every other part. For instance, certain steering fittings are offered as suitable for cars weighing from 800 to 1,500 pounds. Our correspondent would probably use some of these fittings, but it is evident that if they are adequate for a 1,500 pound car they must be of surplus strength for an 8 horse power car. The same applies to other parts. In addition, a good deal of dead weight is likely to be incorporated in the operating devices and connections, which the builder must design himself, and to which he is not likely to give the care they would receive in the drafting room of a manufacturer.

An amateur builder will naturally bear with troubles and annoyances caused by a car of his own construction much more cheerfully than with troubles in cars bought from a manufacturer. He may also succeed in getting his car at a lower cash outlay, if he does much of the work himself. But he can hardly expect to succeed in building a machine which shall be superior to those regularly offered in the market. He may eliminate some particular defect existing in a car with which he is familiar, but for that gain he is likely to introduce a number of faults. The satisfaction of operating a car which is partly his own handicraft and embodies his own ideas will, however, largely eclipse any trouble caused by these defects.

The Coming of the Motor Delivery Wagon.

During the coming year, it is believed, the building of motor delivery wagons will receive a great impetus. In the past this branch of the industry has only been taken up in a half hearted way by manufacturers. When the trade in pleasure cars was slack, perhaps a few vehicles were provided with delivery bodies and sold as delivery wagons, but as soon as the demand for pleasure vehicles appeared again, all efforts were expended in that direction, because the pleasure vehicle business was thought to be less exacting and more profitable.

Under such conditions it is scarcely to be wondered at that the motor delivery wagon has been rather unsuccessful in the past. There is every reason to believe, however, that when increasing competition again makes it necessary to look to this market for the product of automobile fac-

ories, the all around improvement in the reliability and durability of the machines during the last few years will insure such success in their operation that the field of delivery work will be definitely acquired for the automobile.

In our opinion the possible future market for motor delivery wagons may be regarded as in some respects more desirable than that for pleasure vehicles, as its demands would be less fluctuating and not subject to changes in style, etc.

Automobile manufacturers should therefore make it an object to conquer the delivery wagon field completely and permanently and not regard it as merely a convenient market for overflow production in the pleasure vehicle line.

To Be More Democratic.

It is rumored that it is the intention of the officials of the Automobile Club of America, headed by President Scarritt, to make that organization more democratic, and to extend its sphere of activity. The club really has a double existence—as a social organization and as an organization to promote industrial advancement in its particular line. The founders of the club, when launching it, had the latter object pre-eminently in view, to judge by the constitution, and the club has indeed done very creditable work for the industry, but recently the manufacturers seem to be disposed to discourage further activity in this line. Conditions therefore favored the lapsing into the role of a mere social organization, in which it would be of little value to the automobile movement. In such an organization there would be no place for members from the trade and it would soon cease to be a factor in the automobile movement. At present this is practically the condition of one of the larger American automobile clubs which has been conducted on somewhat aristocratic lines, but which, fortunately, shows signs of a revival of interest in automobile matters.

The proposed expansion of the club would enhance its influence and its power to further the cause of the automobile industry. This expansion is also highly desirable for the reason that with a larger membership, comprising both members of the industry and private owners, the club would be more representative of the movement in this country, which, as the American organization corresponding to the large foreign national clubs, it should properly be.

Engine and Boiler Tests of a Locomobile Steam Car.

By L. C. BIGLOW AND F. MARTIN.

These tests were made at Columbia University in May, 1903, and had for their object to ascertain the actual horse power, the steam consumption, the gasoline consumption and the general performance of the Locomobile engine and boiler. The style of the engine is that which is found in the 1902 model steam carriage made by the Locomobile Company of America. The car was practically new, having come directly from the salesroom to the laboratory at the University.

The engine has two cylinders of $2\frac{1}{2}$ inches bore by $3\frac{1}{2}$ inches stroke. Steam is admitted to each cylinder by an ordinary slide valve, and by means of a lever and link motion the cutoff can be varied to suit the operator. The maximum cutoff is five-eighths of the full stroke, which is reached in four steps. The exhaust steam,

pendicular to that of the boiler. The fuel is gasoline of 76° Baumé and is carried in this tank. This latter is connected with an air chamber which in these tests carried variable pressures. The gasoline is forced by this pressure through the supply pipe to the burners. This pipe passes through the boiler, which, when enough gasoline has been vaporized to give a pressure of 60 pounds per square inch by an auxiliary torch, is hot enough to itself vaporize the gasoline. A diaphragm valve is placed between the gasoline tank and the burners and automatically shuts off the gasoline when the steam pressure gets up to 200 pounds.

Power was applied to a brake wheel, which was attached to a steel shaft $1\frac{1}{2}$ inches in diameter, the bearings of which were ordinary babbitted pedestals. The shaft was driven by means of a chain and extra sprocket wheel. There were twelve teeth on the crank shaft sprocket and thirty on the sprocket wheel attached to the shaft. A Prony brake with a 2 foot lever arm was fitted to the brake wheel, as shown in Fig. 1. Water was used to cool the brake wheel on the inside of the rim.

The regular throttle valve was taken out and the valve stem replaced by a hollow rod of the same diameter, threaded at the outer end. The stuffing box was tightened up, and by means of a gauge attached the pressure in the steam chest was obtained.

The method of obtaining the temperature in the tank and feed water is shown in Figs. 1 and 2. Two half inch pipes were plugged at the lower ends, and near the bottom and top of each a one-eighth inch pipe was inserted and firmly soldered in

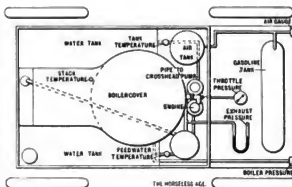


FIG. 3.

place. A Fahrenheit thermometer F was run through a rubber cork C, and this cork was used to stop up the top of the half inch pipe in Fig. 1. The water from the tank entered at A, and after circulating about the thermometer, passed on to the pump through B. The feed water temperature was measured in the same way; but as the water was under pressure from the pump, the cork in Fig. 1 was replaced by a half inch to one-eighth inch bushing C, Fig. 2. A one-eighth inch pipe P with a cap on its lower end was threaded into this bushing, and the pipe was filled with oil to carry the heat rapidly to the thermometer F.

The weights of the water and gasoline used during the run were determined in the following manner: The gasoline and water tanks were filled to the maximum capacity and the boiler pressure was brought up to 200 pounds, after which the fire was turned out. The air in the air tank was then let out and the gasoline tank completely filled. The water tank was treated similarly, the fire lighted, and at the end of the run the water and gasoline necessary to fill their respective tanks were the amounts used.

Eight runs were made under varying con-

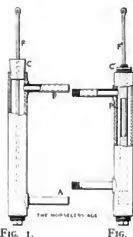


FIG. 1. FIG. 2.

before passing to atmosphere, is led through a vessel through which the tank water passes into the boiler. Reference to Table 11 herewith will show the advantage of this feed water heater.

The boiler is of the vertical fire tube type. It contains 298 fire tubes 14 inches long and five-eighths of an inch in diameter. The shell has a diameter of 13.5 inches and is of copper, strengthened by being wound with steel wire. The total heating surface is 44.5 square feet, with an average water heating surface of 22.3 square feet. The grate area of burner is .67 square foot.

The feed water is supplied to the boiler from a tank in the body of the carriage, partly behind the boiler, and the remainder on both sides of it. By means of a hand pump water can be put into the boiler before starting up. When steam is once generated a pump in connection with the crosshead of the engine supplies water to the boiler. This pump cannot be shut off when the engine is running, but by means of a bypass valve the water will be pumped from the tank and back again. The capacity of the tank is 30 gallons.

The gasoline tank is placed below the footboard of the carriage, with its axis per-

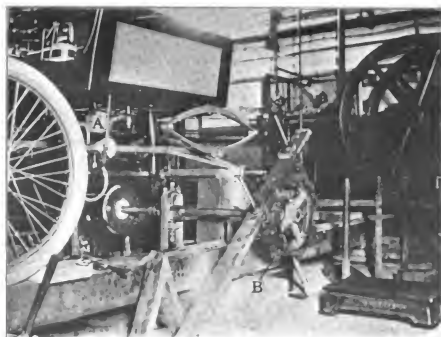


FIG. 4—A. TANK THERMOMETER; B. PRONY BRAKE.

TABLE I.

NUMBER OF TEST.	1	2	3	4	5	6	7	8
Position of cut-off lever	2nd	2nd	2nd	2nd	2nd	2nd	2nd	2nd
Average air pressure on gasoline in lbs. per sq. in.	63.6	58.8	64.5	19.8	75	54.5	70	55
Average boiler pressure in lbs. per sq. in.	166.1	160	141.5	119.2	128	170.4	165	145.5
Average throttle pressure in lbs. per sq. in.	66.2	64.4	65.7	58.2	72.2	83	85	84.5
Average revolutions per minute of brake wheel	364.7	270.4	262	185	180.5	160.4	163.1	160.5
Equivalent road speed in miles per hour	28.4	21	24.2	15.4	16.8	14.6	16.8	13.2
Average revolutions per minute of crank shaft	364.7	270.4	262	185	180.5	160.4	163.1	160.5
Brake in pounds	30	30	30	30	40	40	40	40
Average brake horse power	2.16	2.9	2.88	2.11	30.7	3.96	3.49	3.65
Average indicated h. p., assuming 10 per cent. friction	2.4	3.22	3.2	2.2	32	4.4	3.73	4.05
Duration of test in hours	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
Weight of water evaporated in 100, assuming dry steam	245	255	255	53	330	154	75	185
Pounds of water per brake horse power per hour	64.8	61.4	58.7	50.5	64.3	45.9	39.9	50.8
Lbs. of water per h. p. per h. on a 10 p. c. a and fric. loss	58.8	54.8	52.6	45.7	48.9	41.3	36.7	45.7
Gasoline consumed in gallons	3.56	3.88	3.98	.98	4.40	2.41	1.50	2.50
Gallons of gasoline per brake horse power per hour	94	86	86	86	1.02	.73	.86	.79
Gals. of gasoline per ind. h. p. per h. on a 10 p. c. fric. loss	85	80	87	50	63	45.1	37	60
Rte. of water in lbs. per gal. of gasol., assuming dry steam	48.8	65.7	60.7	77.9	58.3	65.1	56	70.3
Mileage per gallon of gasoline	11.5	8.1	7.2	11.5	11.5	11.5	11.5	6.5
Mileage per gallon of water	1.38	1.33	.97	1.21	.81	.79	.56	.6

ditions of air pressure and load applied, and the results of the eight different runs were averaged and are shown in Table I. Table II will show the method of procedure in the other runs.

Interesting results are obtained from the varying air pressures used. For example, in run No. 4 the lightest air pressure used was 24 pounds per square inch, and no air was added during the run. This resulted in an average air pressure of 19.8 pounds, with a consumption of only .65 of a gallon of gasoline per brake horse power per hour, which, we can see from the previous results, is the most economical of the several runs, although a horse power of only 2.11 was obtained. Calling one pint of gasoline equal to three-quarters of a pound, and supposing one pound of gasoline when burned to give out 20,000 British thermal units, we get a horse power hour on the liberation of 78,000 British thermal units of heat. This is almost as economical as a small size steam plant using coal; the latter consuming 4 pounds of coal, equivalent to 50,000 British thermal units per horse power per hour. But it is not nearly so economical as a very large modern steam plant, which uses from 1 to 2 pounds of coal—12,500 to 25,000 British thermal units—per horse power per hour. Nor does this result compare favorably with the performance of a small gasoline explosive engine, which consumes about one pint, equivalent to 15,000 British thermal units, per horse power hour.

As the air pressure rises the horse power increases, with only a small loss in economy up to about 70 pounds per square inch. From this pressure on the velocity of the

gasoline jet is too great, and the fire burns with a yellow flame, giving off a very unpleasant odor. The gasoline consumption per horse power per hour rises very rapidly, as shown in run No. 5. The air pressure was then over 70 pounds and the gasoline consumed per horse power per hour was 1.02 gallons.

Another effect of too great an air pressure is shown in run No. 6, where the stack temperature increased from 518° to 530° Fahr., while the air dropped from 70 to 63 pounds per square inch. After this the temperature dropped with the air pressure, thus reaching its minimum value between 60 and 70 pounds air pressure.

An attempt was made to find the back pressure on the engine. A hole was punched in the rubber pipe connecting the engine and muffler, and a pipe placed in this hole carried the pressure to a U tube filled with mercury (See Fig. 3). From the difference in level between the two mercury columns the back pressure was calculated, as given in Table II. The highest pressure observed was in tests 7 and 8, when the pressure rose to 3 pounds per square inch.

The stack temperature was obtained by punching a hole in the boiler cover just back of the boiler and hanging a thermometer in this hole (See Fig. 3). This temperature varied from 530° Fahr. to 547° Fahr., according to the condition of the fire.

An attempt was made to find the quality of steam generated in the boiler by replacing the safety valve with a throttling calorimeter. The results, however, were not satisfactory, as the calorimeter took such a large percentage of the power of the boiler

that but little steam was left for the engine. However, it was shown that under ordinary light running conditions, with engine giving about 2 horse power, there is about 3 per cent. of moisture in the steam; but by rapidly changing the load on the engine from zero to maximum, the quality of the steam varies from a few degrees superheat down to 5 per cent. and 6 per cent. of moisture.

Owing to throttling and consequent wire drawing of the steam between boiler and engine, all the steam used in the engine is in more or less superheated condition. In tests 7 and 8, with a load of 60 pounds on the brake arm, the throttled pressure only got up to 100 pounds with a boiler pressure of 155 pounds, which leaves a drop of 55 pounds for superheating.

In tests 7 and 8 the crosshead pump was not equal to the demand made upon it by the boiler, and the water level in the boiler dropped slowly in both runs.

Standard Dimensions for Accumulators and Accessories.

The committee appointed at the last International Automobile Congress to investigate the questions of (1) standardization of accumulator plates; (2) standardization of the cells to contain the plates, and of the numbers of cells to be used; (3) standardization of charging plugs; (4) standardization of ignition batteries; (5) standardization of spark plugs, at its meeting on November 24 adopted the following standards (25 mm. = 1 inch):

Accumulator plates—uniform width of 4 inches; height including connectors, to 4 inches.

Cells—five sizes, as follows:

OUTSIDE DIMENSIONS.

No.	Length, in.	Width, in.	Height, in.
13	4.52	4.48	10
15	5.16	4.48	10
17	5.84	4.48	10
19	6.40	4.48	10
21	7.12	4.48	10

The maximum height of the cell with connections to be 11.4 inches. Total height of battery tray, 12.8 inches.

Charging plug—the one in use by the Electromotion firm (Electric Vehicle Company).

Ignition batteries: 4.28 inches × 3.2 inches × 9.2 inches, including connector.

Spark plugs—De Dion thread.

Calendar of Automobile Dates and Events.

January 16 to 23—Madison Square Garden Automobile Show.
January 21 and 22—Annual Meeting and Banquet of the N. A. A. M.
January 23 to February 4—Brussels Show.
January 25 to February 6—Meet of the Florida East Coast Automobile Association.
February 6 to 13—Chicago Automobile Show.
February 12 to 24—Crystal Palace Show, London.

TABLE II.

Time	Mileage Reading	Revolutions per minute	Gauge Air Pressure Lbs. Per Sq. Inch.	Gauge Boiler Pressure Lbs. Per Sq. Inch.	Gauge Throttle Pressure Lbs. Per Sq. Inch.	Tank Temperature, Degrees Fahr.	Feed Temperature, Degrees Fahr.	Exhaust Pressure Lbs. Per Sq. Inch.	R. P. M.
3:30	90.5	74,093	40	200	...	75	212	2.5	...
3:35	91.5	74,730	70	200	65	82	212	2.5	250
3:45	95.12	77,580	55	190	70	84	212	2.1	260
3:55	99	80,140	50	185	65	87.8	212	2.2	260
4:05	102.12	82,470	48	180	60	88	212	2.2	261
4:15	105.75	85,090	40	175	55	92.6	212	2.3	264
4:25	109	87,470	74	182	65	96	212	2.3	260
4:35	112.62	90,120	60	185	60	98	212	2.3	261
4:45	115.41	92,554	60	...	...	...	...	...	...

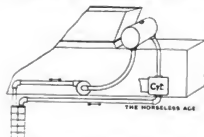
Water used, 25 gallons. Gasoline used, 3.98 gallons. Brake load, 50 pounds.

Improvements in the Water Cooling System of a Runabout.

By T. P. DRIVER.

Having had many requests for data on the water cooling system used on my runabout during the ascent of Mt. Washington, I feel bound to enlighten the readers of THE HORSELESS AGE on the subject. I use a 1 to tube disk radiator set five tubes high and two tubes wide, securely fastened to the angle iron frame. I got it three years ago, and had to assemble it myself. The copper disks are galvanized onto the brass tubes. Various combinations with the old radiator and water tank were tried, also with new and impossible tanks, but last year I struck a combination that has been very satisfactory, except that in cool weather it takes some time to get things hot enough to give full power.

The supply tank is cylindrical, 5 inches in diameter, located above the body just behind the seat, and as long as the body is wide. From this tank connection is made to the top of the cylinder jacket, and from the opposite end of the tank connection is made to the suction end of the pump. From the pump the water is



RUNABOUT COOLING SYSTEM.

forced into the radiator and then returned to lower opening of the cylinder jacket. This is not an ideal arrangement, but it works well, with the pump that came with the machine, too.

The extra lift allowed the hot water from the cylinder to the tank makes it possible to operate the motor without any pump at all, when not too much slow speed work is necessary. This I have done many times, especially in cold weather, on good roads.

The tank should be of copper, No. 16 gauge, and all outlets should be reinforced with flanges so that the vibration will not break the copper around the same. Use only copper or brass fittings, as sometimes calcium chloride may be used. Of course, a vent must be made in one way or another in this tank. For general idea see sketch.

Albert de Pallange, the chauffeur of Count Zborowski during the fatal Nice-La Turbie hill climbing contest accident, considers that the accident was due solely to the imprudence of Zborowski, and has brought a damage suit for 100,000 francs against his estate.

LESSONS OF THE ROAD.



The Shenandoah Valley and the Allegheny Mountains.

By W.

The Shenandoah Valley, once so popular with touring wheelmen, owing to its rare combination of easy grades, good roads, fine scenery and its historic interest, has not found equal favor with the automobilist. This may in part be due to the poor hotel accommodations met with south of Hagerstown. Hot water and bath rooms are scarce, and suppers after half past 7 to be found only at dirty tables in the rear of some equally uninviting saloon.

I had been advised to make the trip early in the fall, to anticipate the road mending season, that unpleasant feature of all turnpikes, but was unfortunate. We encountered long stretches of freshly broken stone, and frequent piles of the same in the middle of the road proved a constant menace to night riding. Inquiry from several sources elicited the information that this work was in the nature of a movable feast, performed as the spirit moved them, May and June being as frequently used for the purpose as October.

PREPARING FOR THE TRIP.

My car is of two cylinder type, weighing about 1,500 pounds, and is rated at 11 horse power. In preparing for the trip I removed the tonneau and substituted a box. This held, with careful packing, an additional 6 gallon gasoline tank, a can of cylinder oil, our personal baggage and a couple of extra inner tubes and parts. It proved to be far more satisfactory than using the tonneau for this purpose, as it not only protected our possessions better from rain and dust, but enabled us to keep them under lock and key when the car was stored for the night under open sheds in stable yards. Should I ever have another made I would sacrifice appearance to utility and have it more roomy.

My companion, who had already accompanied me on several shorter runs, was a most desirable one for a trip of this kind, being a good amateur machinist, with unbounded enthusiasm for automobilism, and more than willing to do his full share of the work. I soon dropped into my place as merely consulting engineer, while he assumed the task of making the motor mote as well as taming wild horses and soothing frightened ladies—if they were young. I soon found that the less prepossessing sisters were usually left to my fatherly care.

For several reasons we thought best to ship the machine to Harrisburg, Pa., and make our start from there. We reached that city on a Monday morning early last September, and after breakfast made our way to the freight yards, where we found the car in good condition waiting for us



COLUMBIA BRIDGE ACROSS SUSQUEHANNA RIVER.

on the platform. A short time sufficed to attach the lamps and pack our belongings into the box, and, after filling our tank with the poorest gasoline purchased on our entire trip, we were ready to start.

MISJUDGED BY NATIVES.

As we wished to spend a day in Philadelphia, as well as visit friends in Lancaster, we took the Lancaster pike via Steelton, and found it a miserable road. Near Middletown we stopped to oil up and look the car over, as we had not done so before leaving Harrisburg, and soon had an audience in the persons of an old lady, her son and two daughters. They made themselves comfortable on the grass by the roadside, announcing their intention of remaining until they could see the thing start. The young ladies having proper regard for the safety of life and limb, firmly refused to try the seat. Automobile tourists must have been strange to them, as they indulged in various conjectures as to our mission in life, and decided that we were selling something and carried our stock in the box. Finally their patience was rewarded and our journey resumed.

After reaching Lancaster County (20 miles from Harrisburg) the road improved and toll gates appeared. We were charged 50 cents for 16 miles. We spent the after-



CONFEDERATE MONUMENT AT MT. JACKSON, VA.

noon in Lancaster and started the next morning for Philadelphia. Just as we left the stable the rain began to fall, and before we had left the paved streets it developed into a heavy downpour. Rain coats were donned and we pushed ahead, although the prospect was far from pleasant.

A RUNAWAY.

Not far from town we had an experience which might have resulted in a serious accident. We met a boy of perhaps fifteen, driving an old covered wagon loaded with empty milk cans. The horse showed indications of fright, but, as usual, not as much as his driver, who pulled him over toward the fence. As we noticed that the shaft band had broken, we stopped the engine, being fully 50 yards from the wagon, and my companion advanced to the rescue. He was too late, however, for the horse made a bolt toward us, the wagon struck the fence and upset, throwing the boy into the field. Fortunately he was unhurt, and the horse stopped at a house we had just passed, the owner of which, having seen the entire occurrence, freed us from any blame. We righted the wagon and did what we could to fix things up. With a strong harness or a man in the wagon the accident would not have taken place.

We always made an effort to show consideration for drivers on the road, stopping the engine whenever necessary and allowing horses to become acquainted with the machine, and with one or two exceptions have received courteous treatment. However, anyone accustomed to handling horses would be struck with the lack of skill and judgment shown by the average country driver, and I believe that many accidents are due to this.

ROAD CONDITIONS.

The pike to Coatesville is in poor condition, and the country road to the north of it is doubtless better in good weather. Beyond Downingtown the road improves, and from Paoli in it is fine. One does not begrudge the toll charged on a road like this,

but for the neglected turnpikes of Lancaster County it is certainly an imposition.

For some time before leaving home we had been annoyed by a knock and periodical loss of power, which the local repair men had been unable to locate. This had been growing worse, and before reaching Philadelphia we decided that a visit to the factory would be advisable. At headquarters the trouble was quickly diagnosed as a loose flywheel, and a day in the shop put the car in excellent shape.

The rain continued all night and the following day, and by 4 o'clock in the afternoon, when we started on our return trip, the roads were decidedly damp. The only stop made was to fill the generator for our lamps, and Lancaster was reached by 8 o'clock, but the ride was not a specially delightful one. Every now and then we would drop into mud holes and ship a sea over the bow, so that machine and passengers were beautifully decorated by the time our destination was reached.

Thursday we spent in Lancaster, so that the roads might dry off a little, and the following morning started early for Gettysburg by way of Columbia and York. The road to York was very good (toll 43 cents for 24 miles, also 40 cents for the bridge at Columbia). From York the pike is in miserable condition, especially toward Gettysburg, but 44 cents was charged for the privilege of using it.

AN ACQUAINTANCE IN TROUBLE.

Not far from York we came upon a heavy four cylinder car, having chain drive to the wheels, by the roadside. We stopped and were surprised to find an old acquaintance in the owner, who was on his way to Philadelphia with his wife and sister. He had broken a strut, and was feeling somewhat discouraged, although the ladies were doing their part nobly by sitting quietly on the grass asking no questions. We lent him some little assistance and more moral support, and a temporary repair was made which I hope took him into York.

Gettysburg was reached in time for din-

ner, and the remainder of the afternoon was devoted to a tour of the battlefield. The odometer registered 20 miles for the afternoon, all parts of the field being visited except the scene of the cavalry fight, near which we had passed in coming into town.

The next morning we filled our gasoline tank and started at 9:30, taking the Hagerstown road. This proved a rough pull until the mountain was crossed, and the Waynesboro pike reached. Some of the grades were quite steep, but the scenery was fine in the neighborhood of Monterey and Charmian Springs.

At Waynesboro we had dinner and left for Hagerstown, where we also made a short stop, continuing on to Martinsburg, W. Va. We expected to cross the Potomac at the Williamsport ferry, which is the direct road, but were misdirected and found ourselves on the Antietam battlefield. This made our run to Martinsburg 7 or 8 miles longer, but we were glad to be able to see the field, which has now some fine monuments and is well covered with markers.

Passing through the quaint little town of Sharpsburg, we found a stretch of broad macadam road for 2 or 3 miles and were soon at the river, crossing by the Shepherdstown bridge (toll 35 cents; bridge 25 cents). Martinsburg was reached by 7 o'clock, the last few miles being very rough and stormy. The run, 61 miles, we considered good enough, in view of the number of stops made.

MOONLIGHT RIDE IN LOCAL CAR.

Several light runabouts are owned in Martinsburg, and, I believe, one touring car, and one of the owners kindly called at the hotel and invited me to take a little moonlight run down the Winchester pike with him.

Sunday morning we spent at Martinsburg and the middle of the afternoon started up the Valley pike, the scene of Sheridan's ride, to Winchester. This 22 miles (toll 26 cents) is by all odds the best stretch of road in the valley. We took it slowly for the



A FLAT TIRE.



HILL NEAR GREENSBURG, PA.



OLD TAVERN NEAR CHAMBERSBURG.



OLD STONE BRIDGE NEAR YORK, PA.

most part, but were tempted into "letting her out" on a couple of long, straight stretches, and flattered ourselves that we were making the mile posts look like a paling fence.

At one point we approached a church, and as twenty or thirty horses were hitched along the road we came to a stop and tried the horn. The sound must have almost broken up the service, for inside of three minutes a man was at every horse's head and we passed without accident.

The night was spent at Winchester and the following morning a start was made up the valley pike through Woodstock, Mount Jackson and half a dozen smaller towns at intervals of 4 or 5 miles to New Market (49 miles, toll 75 cents). Here we had dinner, and leaving the pike we turned to the left and crossed the mountain to Luray (14 miles, toll 10 cents, ferry 25 cents). The road over the mountain is rather rough and sandy, and as the belt had stretched so that the speed of the fan was reduced we were delayed by the water overheating. We also had

A FLAT TIRE,

and would have saved time had we repaired it at once, but the frequent stops to pump it up gave us an opportunity to better appreciate the scenery, and we finally reached Luray at 4 o'clock.

This gave us ample time to repair our tire and give the machine a thorough overhauling before supper. In the evening we visited the cavern, which is well worth seeing, and got away at 7:30 the next morning, intending to run through to Natural Bridge if all went well, but this was our unlucky day.

As we approached the ferry and were taking advantage of a fairly good stretch of road we rounded a sharp curve and dropped into a deep mud hole. This proved too much for one of the front springs, which broke in half at the first bolt hole. The front of the machine dropped so that the radiator struck the headlight and I brought it to a sudden stop.

A REPAIR KINK.

Last year I read a book entitled "Two Thousand Miles in an Automobile," and to its author I owe the suggestion which stood us in good stead at this time. That was the advantage of being provided with a short leaf of a carriage spring and a pair of clips, a hint I had acted on before leaving home. The jack was soon out, the car raised and an hour's work made a repair which took us safely back to New Market. Here we had dinner again and visited a carriage shop, where we had our lamp bracket lengthened to reach another bolt, had heavy clips put on, and were once more ready to take the road. The accident was due chiefly to a broken bolt.

Our journey was resumed, but troubles never come singly, and we found ourselves limping along unable to keep our spark in proper adjustment, so that we failed to reach Staunton (43 miles from New Market, toll \$1.12) until 8:30. It had grown quite dark, and about 6 miles from Staunton my attention was attracted by a row of bright lights on the hill side to our left. Thinking it might be a summer hotel I stopped and inquired at a cabin by the road, but was informed that there was nothing up there but the railroad station, and on looking up saw, to my disgust and my companion's amusement, my hotel moving slowly down the valley.

At Staunton, where the pike ends, we were informed that the road to Natural Bridge was in very bad shape, and in view of our weak spring we did not consider it wise to try it, and so took the back trail at 8 the next morning, although the run to the Bridge was only 47 miles. Six miles out of town we stopped in a grove of fine old trees surrounding a little stone church, which we were told had been in use for 120 years. Here we succeeded in getting a better spark, and in a brush with a touring car met later in the day we showed plenty of speed. In passing through Harrisonburg we were warned that we must keep our horn going to avoid arrest. In this town we picked up a nail, a fact discovered at

a point where there were no trees, and we passed an hour sitting in the dust. At New Market we registered for our third dinner, and each time found it a good place to stop. In the afternoon we made good time, and felt that for once we would be in before dark; but when 18 miles from Winchester we heard a grind under the floor boards, shortly followed by a crash, and the car stopped.

LOST SCREW CAUSES TROUBLE.

We pushed it to the side of the road and found that the small screw and lock holding the Cardan joint cap screw in place had been lost, the cap screw had followed and the drive shaft had jumped out, almost knocking a hole in the bottom of the gasoline tank. We had no extra cap screw, and were not feeling very cheerful; but the offer of a quarter secured the interest of a couple of boys who had appeared on the scene, and the reward was most cheerfully paid when one of them appeared with the missing part. The inner thread was badly mashed, but we managed to force it in far enough to hold the shaft, and a screw and lock were soon made. We ran into Winchester very carefully, too late for supper but fortunately in time to secure the last room in the hotel, as they were in demand owing to its being circus night.

The toll gates between Winchester and Staunton are mostly 8 miles apart, the usual charge being 12 cents, or 1½ cents a mile.

On our previous visit we made the acquaintance of Mr. German Smith, who had owned a steam machine and had just ordered a new gasoline car. He very kindly placed his automobile stable at our disposal, which proved a great improvement on the stable yard, especially as it rained heavily that night and most of the following day. I had telegraphed for a new spring to be sent here, but it failed to arrive until almost noon of the second day. Most of our time between visits to the express and telegraph office was spent in putting the car in good shape. A local jeweler cleaned out the thread of the damaged cap screw with a graver, so that it once more fitted as well

as ever. Our repaired spring was holding so well that when the new one came we merely added it (a somewhat weighty addition) to our repair kit. Everything being ready we said good by to our friends, and about noon started for Hagerstown.

At Martinsburg we stopped for an hour or so with relatives, and at 4:15 resumed our journey. We were advised to return as we had come, as there were often long delays at the Williamsport ferry, and the boat frequently was unable to run in close to shore, compelling one to drop off into a foot of water where the bed of the river was very rocky. The charge is, I believe, \$1. To avoid the bad stretch of road near the town we went to Shepherdstown by the Charlestown road, via Riley's Ford bridge, which, although longer, was a much better road.

Hagerstown was reached in time for supper, another short stop having been made at Antietam.

The following morning we ran over to Chambersburg, 22 miles; the first half of the way, to Greencastle, was very good, but beyond that the road grew worse and worse.

A WEAK VIBRATOR SPRING.

The trouble with our spark adjustment continued, and before we reached the end of our journey the cause was discovered to be not at the coil but a weak vibrator spring, which finally broke in half at the platinum point. We should, of course, have examined this sooner, but that was simply one of the many things learned on this trip. We had no extra spring among our spare parts, but fortunately no heavy grades were before us and we took out one plug, tied up the wire and went ahead on one cylinder for 8 miles. The speed was slow and the noise far from pleasant, but we arrived in time. A new spring was made, which is still doing the work, although a couple of extra ones have been added to our outfit.

Near Chambersburg we were compelled to postpone the completion of our trip and return home by train, but three weeks later our journey was resumed. After a little side trip over the Baltimore pike, a splendid macadam road crossing the mountains to Gettysburg, we started westward on the old Pittsburg pike.

Chambersburg, in the Cumberland Valley, lies between two low mountain ranges and our first ascent began as soon as the Conococheague was crossed. Toll was charged as far as Bedford County, 55 cents being the total. After passing through Fort Loudon, 14 miles, we crossed Cove Mountain, a long pull, rather sandy in places, with no springs or watering troughs along the road. However, our fan belt was tight and we had no overheating, although we had to use our low speed for most of the climb.

FINE AUTUMN VIEWS.

The views were fine, the coloring of the trees adding greatly to the beauty of the scenery. The road winds down the west

side of Cove Mountain, giving momentary glimpses of the little town of McConnellsburg in the valley below, which is 8 miles from Fort Loudon. We passed a number of four horse teams, many of them hauling freight or express matter, Fulton County being, I believe, the only county in Pennsylvania having no railroad.

At McConnellsburg we had dinner, and learned that a man and his wife had passed through about an hour before us in a light gasoline machine. Sidling Hill and Ray's Hill were both crossed without trouble, the road being rather sandy in places but otherwise good. There are several springs by the roadside. At the foot of Sidling Hill we met two gentlemen from Pittsburg who were devoting their vacation to a pedestrian excursion, having Gettysburg as their destination. They seemed to be enjoying their trip, and we spent half an hour exchanging experiences, and after taking a picture of them we parted.

LEAKY TANK CAUSES A STOP.

Not long after this we came up with our automobile tourist, who was in trouble and had sent his wife on in a passing buggy. We stopped and found that his gasoline tank had broken at the connection with the vaporizer, and he seemed to be having other troubles. He asked for a gallon of gasoline to take him in to Everett, which we of course let him have, as he had an extra can; but were rather surprised when he put it in the front of his machine, explaining that he might not need it. He had caught part of his gasoline, and, after the leak was repaired, poured it back into his tank, somewhat enriched, however, by the oil and dirt from his chain, over which it had dripped. When he was satisfied that he was all right we went ahead, but although we took our time he failed to come up with us.

After reaching Bedford County the pike became more stony. Scrub Mountain was crossed and a number of old stone houses passed, many of which were taverns in stage coach days. Six miles east of Everett the Juniata is reached, and the road follows it as far as Bedford. The scenery along the river is beautiful, but it was too dark for us to enjoy it.

GASOLINE HARD TO SECURE.

Gasoline is often hard to secure in the evening, and we had some little trouble at Everett, but finally succeeded, as we were to make an early start in the morning. We had supper and by 10 o'clock were in bed.

It rained all night, and on looking out of my window, a little before 5 next morning, I found it dark and cold and the rain still falling. Half an hour later the situation had not improved, but I called my companion, and by 6 we were on the way. At the edge of the town we found that we had broken a bonnet fastener, and lost fifteen minutes retracing our way without finding it. The road to Bedford, 8 miles, is good, but the bridge had been burned and we were compelled to take a clay road to one a mile or so farther on. This road, cut in

the side of the hill overlooking the river, was narrow and very slippery. We skidded in a number of nasty places, but fortunately stuck to the road, and by 7 o'clock were at Bedford ready for breakfast.

HARD ON TIRES.

By 8 we were heading westward again, but with little hope of making Pittsburg, in view of the weather conditions and the fact that the sharp stones of the valley pike had left their impressions on our tires, and we anticipated lots of trouble from that source.

The 10 miles of road from Bedford to Schellsburg is not bad, but here the ascent of the Allegheny Mountains begins. The rain had washed out all the dirt, but had not rounded the edges of the stones, and rips soon began to appear in our tires. Our stock of tape was low, and what we had was light insulating tape which cut through so rapidly that it was hardly worth using. However, we had 100 feet of strong sash cord, which answered the purpose better. The grade was nowhere over ten or twelve per cent. Occasionally stretches of sand were met, but the road was mostly covered with small, loose stones.

As we reached the crest and thankfully slipped in our third speed for the level sandy stretch at the top, we were surprised to see another machine coming toward us from the west. In this isolated region we felt as travelers abroad do at meeting someone from home, and pulled up for a little talk. The newcomers proved to be Mr. Post and Mr. Sheldon, in the former's White touring car with which he had accompanied the Endurance Run. They had spent the night at Stoyestown and were heading for New York. On reaching Ligonier we learned that they had passed through there the previous night at 9 o'clock and pushed on to Stoyestown over 18 miles of perhaps the worst road in the State.

RAIN AND BAD ROADS.

The rain stayed with us, as did the bad roads, and by the time Stoyestown was passed and the Laurel Ridge reached, rips 8 and 10 inches long had developed in our tires, and at one place the inner tube was exposed. Luckily we discovered this in time. The only rope we could buy was soft clothesline and some one inch stuff which was no better, as we had to stop every ten or fifteen minutes to tie the ends together.

Our engine gave us no trouble whatever, but five hours had been spent on the tires—not pleasant work in rain and mud. It was growing dark by the time the summit of the Laurel Ridge was reached, the road having grown worse and worse, but the western slope, 4 or 5 miles long, was the limit. I greatly regret that I was unable to take any pictures. It could hardly be called a road, as it is only a clearing through the trees, paved with rough rocks of from 18 inches in diameter down, all of which seemed to be on edge. The wet stones and the grade made it hard to check the car very promptly, but we came through without any

breakage and were finally within sight of Ligonier, where we decided to spend the night, as we made no stop for dinner.

However, a hard pull was yet ahead of us, for a twelve per cent. grade of perhaps 100 yards leads up into the town. Here the stones so much in evidence all day were conspicuous by their absence, and our driving wheels were soon slipping in heavy mud. It was the final struggle, and a half hour of hard pushing and racing the engine finally brought us to the top, supper and good beds.

Sunday morning we spent a couple of hours in looking the machine over and removing the ragged decorations from our wheels which we replaced with new sash cord, purchased the evening before.

THE FINAL STAGE.

A start was made shortly before noon on our final 47 miles, and everything went well until Greensburg was almost reached, where, after a short stop to look over the

hotels and on the road. At night we stored the car usually at the hotel stables, the charge ranging from nothing to 50 cents. Hagerstown was the only place I was charged \$1. Gasoline I was able to get whenever needed and had no trouble as to quality. It usually tested 70° or a little under. The storekeepers always claimed that it was sold to them as 72° or 74°. The price ranged from 17 cents to 20 cents. With the exception of the break in the spring, which was due to no fault in the machine itself, my breakage was small, but the wear and tear on tires was awful and I was very unlucky in the matter of punctures. Of course, with newer tires to start with this would have been less. We made no effort at speed or long runs (90 miles being our best), and stopped frequently to take pictures or interview the chestnut trees. The trip was thoroughly enjoyed, although we had our full share of trouble, more or less being such as falls to the lot

The mechanical method has the advantage of keeping the bearings clean, as the continual stream of oil prevents dirt or grit from lodging in them, and is also very economical. Furthermore, it acts independently of the driver and starts and stops with the engine.

There is one disadvantage in splash lubrication, namely, that any dirt or grit that is in the splash chamber is held in suspension by the constant churning of the oil and given no chance to settle. The plan of supplying the oil to the different bearings under pressure is therefore the better.

LUBRICANTS TO USE.

Grease lubrication is becoming more popular, and justly so. It is in a way automatic, as the warmer the bearing grows the faster the grease feeds. For the inside of the cylinder, steam cylinder oil must be used; for the other parts a good, medium weight oil, such as lard oil, is as good as any. For ball and roller axle bearings vas-



THE PIKE—SHENANDOAH VALLEY.



BETWEEN GETTYSBURG AND WAYNESBORO.

tires, our engine refused to start. The usual list of troubles—spark, gasoline, etc.—were promptly tried, but without effect, and as a last resort the carburetor was disassembled, and the engine once more responded to a half turn of the crank.

Ten miles farther on we were again brought to a sudden stop, this time by our damaged tire letting go. The process of tire changing was not expedited by the cord wrapped around the wheel, but at last a new shoe, which we had held in reserve, was in place, and bidding good by to an audience unusually large for the country, we went ahead. This ended our troubles and home was reached in time for dinner. The machine seemed to feel glad to be back and forgetful of rough treatment, as it showed lots of speed when the paved streets were reached once more, and made a creditable finish for a run of almost 1,000 miles.

SUMMARY.

Our experiences were very pleasant throughout. We were treated kindly at

of all who go down the pike in automobiles.

Steam Car Accessories.

(Abstract from a lecture by Parker H. Kemble before the Boston Y. M. C. A. Auto School.)

LUBRICATION.

Lubricant may be supplied to the wearing surfaces in two ways. One of these consists in feeding it drop by drop from an ordinary oil cup which may be placed either directly over the bearing or, if the latter be inaccessible, at any other convenient place, the oil being then led to the bearing by a pipe. In the latter case care must be taken to have the pipes large enough not to clog easily, and to avoid sharp bends which would prevent running a wire through the pipe occasionally to keep it clear. A second way is to supply the bearings by the splashing of the parts in an oil bath or by pumping a continuous stream of oil through the bearings, collecting and straining it, and then pumping it through again.

elene or a good grease mixed with a little graphite will prove satisfactory. For chains a good cleaning followed by a soak in hot grease and graphite is conducive to quiet running.

Use plenty of oil, but keep the excess wiped off, so that dust and dirt will not collect, and when you have a bearing to oil that only takes a few drops, put the nose of the oil can in the oil hole and press gently till filled. Don't hold it 2 or 3 inches away and squirt all over everything in sight.

FUELS AND BURNERS.

Liquid fuels are at present universally used on steam motor cars for pleasure use. They raise no dust, do not smoke, and produce no ashes. They occupy less space than solid fuels, and are more easily handled. Their disadvantage is high cost and ability, not liability, to explode. All liquid fuels are vaporized before being burned. This may be done by heating or by atomizing. By heating, a gas is formed; by atomizing,

a fine mist or spray. Most burners on the market today belong to the heating class.

Gasoline and kerosene are the two forms of liquid fuel best adapted to motor car work. Of these gasoline is the most popular. It is cleaner to handle and easier to burn, and requires less care. There are, however, several successful kerosene burners on the market, and the steadily rising price of gasoline and the greater safety of kerosene are powerful factors in stimulating the development of this type of burner. Another factor is that kerosene may be found at every country store and in almost every house.

All burners should be fitted with pilot lights or starters. These are small burners which can be raised to the temperature necessary to vaporize the fuel by burning under them a few drops of alcohol or gasoline, and which then supply the heat to warm up the main carburetor burner. They also keep the main burner hot and ready for use during stops when it is shut off.

One strong argument in favor of liquid fuels on cars is the ease with which they may be controlled by automatic regulators.

LAYOUT OF POWER SYSTEM.

The machinery of steam motor cars may be separated into three divisions: The steam line, the water line, and the fuel line. In case of any trouble, take the line where you think the trouble lies, and follow it through from one end to the other; then, if you still are at sea, take the other lines in their turn. Don't skip all over the car looking first on one line and then on another.

The steam line contains the throttle valves, of which there should always be two—the main throttle, by which the car is controlled, and the auxiliary valve close to the boiler, by which the steam can be shut off from the main valve and the piping. If a condenser is fitted, the condenser pump and grease separator also come under this division. The water line starts at the water tank and passes through hand and power feed pumps, feed regulators and heaters to the boiler. The fuel line starts at the fuel tank and runs through the fuel pumps (where fitted), regulators and vaporizer to the burner. The air pressure mechanism comes properly under this heading.

SAFETY DEVICES.

The genus homo is not infallible, neither are the best of automatic appliances. To make up for the lapses of both, numerous safety devices and alarms have been devised. Of the latter the two most important are the safety valve and the fusible plug. When the steam pressure rises beyond the determined point, the safety valve, which is held closed on its seat by a spring, opens and lets the steam out into the air. The fusible plug prevents damage by low water. It consists of a brass plug with a hole running through it filled with an alloy of lead that will not melt as long as it is covered with and kept comparatively cool by water. If, however, the water be removed, the plug will heat to a point where

the alloy melts and the steam blows out and gives warning of low water. The plug should be so placed in the boiler as to give its warning before all the water has been evaporated. It should be located in some part of the furnace where it will be subject to great heat without being in actual contact with the flame. In flash and semi-flash boilers it is unnecessary, as these boilers are not affected by absence of water. In most water tube boilers it can be omitted, but in those having a large drum partly filled with water it should be used.

LOW WATER ALARMS.

Under the head of alarms, those referring to the height of the water in fire tube boilers are the most important. There are two general methods of construction. In the first a float is used, so connected with a small steam whistle that as long as the water level is above the danger line the float keeps the whistle valve closed, but should the water level fall, the weight of the float falling with it opens the valve and blows the whistle. Another form of this same type, instead of blowing a whistle, sends up a jet of steam in front of the driver.

The other method depends on the different temperatures of steam and water when away from the boiler. It consists essentially of a small tank connected with both the steam and water spaces of the boiler and containing a bulb of mercury and the points of two electric wires. When the water is above the danger level, the bulb is covered and kept cool; when the water sinks, the bulb is exposed to the heat of the steam, the mercury in the bulb expands and, joining the two wires, rings an electric bell. These alarms, as the fusible plugs, are only necessary on boilers where the loss of water means disaster.

PUMPS.

All pumps are either hand pumps or power pumps. Power pumps may be driven from some moving part of the engine, when they are called direct connected; by gearing from some shaft—called geared pumps—or by a steam cylinder of their own, when they are called independent feed, or air gasoline pumps, as the case may be.

In current practice, hand pumps are supplied as a reserve or for use when the carriage is not under steam: direct connected pumps for regular use when under steam, and independent pumps either as an additional precaution against break down of the usual power pumps or to perform services which are only required at intervals, but are too heavy for hand power. Under this head would come pumping the pressure in the fuel tank as arranged in some cars.

The most important pump on the car is the feed pump. On the regular working of this member depends the progress of the car and the comfort and pleasure of the operator. The usual practice is to drive this pump from the crosshead of the engine, so that it makes a stroke for every stroke of the engine. With the present speeds and

short strokes the direct connected feed pump is the greatest nuisance on the car. A far better plan, where the construction of the car will allow it, is to drive the pump by gearing from some shaft or axle, at slower speed than that of the engine. Independent steam feed pumps, while very convenient if the power pump gives out, are very large steam users, and for that reason are not recommended for the regular water supply.

The feed pump is, of course, part of the water line. Where a condenser is used a pump is needed to pump the water from the condenser to the main tank through the grease filter. The remarks as to driving of feed pumps apply here, but with less force, as there is no pressure to overcome.

In some carriages an ejector is fitted for filling the water tank from some outside source.

FUEL FEED METHODS.

Liquid fuel burners in present practice require their fuel to be fed under considerable pressure, from 30 to 80 pounds. The earlier method of providing this pressure was to pump air into the main fuel tank. This method is still used by many makers, but is open to grave objections. The whole body of fuel is under pressure and any leak or break in the tank or piping emits a stream of gasoline or kerosene under pressure, which, with the proximity of the burner, is dangerous. The only thing that can be quoted in its favor is that the air pressure can be pumped up at intervals and it is not necessary to have an air or fuel pump under continuous operation.

The other method of supplying the fuel, which is used by several makers and is gaining in favor, is to have a power fuel pump, similar to the feed pump, which pumps fuel into a small pressure tank holding from a half pint to a quart and from there to the burner. This system needs a bypass on the fuel line, to take care of surplus fuel when the burner is shut down. There is one ingenious automatic fuel pump on the market which stops pumping when the required pressure in the fuel line is reached, thus avoiding the use of a bypass valve.

REGULATING VALVES.

Regulating valves as used in steam motor car works are actuated by either pressure or temperature; when by temperature they are known as thermostats and are used to shut off the fuel supply on flash and semi-flash boilers.

Regulating valves consist essentially of two parts, the governing part and the valve. The latter is usually a needle valve where used to control small quantities, and a mushroom valve where the quantity is large. In a needle valve the moving part is sharply pointed and presses into a tapered seat, allowing a very delicate adjustment, but offering a very small passage, even when wholly open.

The governing part consists of a diaphragm or flexible plate, on one side of

which the steam or fluid presses; and a spring which, pressing against the other side, opposes the pressure of the steam or fluid. This diaphragm is connected with the valve by a rod and according to whether the spring or the pressure is the stronger the motion of the rod opens or closes the valve. The adjustment of the spring is variable and this in its turn governs the pressure required to move the diaphragm.

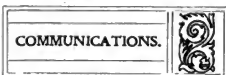
Pressure regulators are used for bypass valves, water regulators, and, with the fire tube boiler, for fuel regulators.

In thermostats the motion for actuating the valve is obtained by the variations in length of a bar of brass, copper or iron under the influence of the heat.

The muffler and feed water heater remain to be considered. The first serves to prevent the noise of the exhaust on non-condensing cars.

It consists essentially of an enlargement of the exhaust pipe where the steam is free to expand to atmospheric pressure. As the noise of the exhaust is mostly due to the difference in pressure between the exhaust and the air any method of reducing the pressure will reduce the noise.

A feed water heater is what its name indicates, and, if combined with the muffler, saves some of the heat from the exhaust steam.



Transmission Efficiencies.

MILWAUKEE, Wis., December 6.

Editor HORSELESS AGE:

Mr. Clough's statement in a recent issue of THE HORSELESS AGE regarding the desirability of having a transmission efficiency test has struck a responsive chord. I was one of the first in this city to operate what is publicly denominated an "ice wagon," and from year to year—this being the fourth—I have improved it in some one part or other. This winter finds me in the same position. For the last three seasons I have used a shifting belt style of transmission, that is, tight pulleys of different diameters on the shaft of a 4½x5 inch horizontal engine in front, with two belts running to a countershaft, and with a chain from there to the rear axle—which, taken in all, is very cheap to make, economical in power and quiet running; it has only proved annoying when the belt became overloaded so as to slip on the pulley and smoke.

Never having had a chance to use or be with a vehicle equipped with either a shaft or "Panhard" style of drive, I would like to give one of them a trial this time. My vehicle has never weighed more than 800 pounds, nor do I wish it to weigh more this

time. I have also built a new 4½x6 inch motor to operate it next season.

Any information as to efficiency, weight, applicability, etc., would be gratefully received, as I have been waiting for something to appear in "our paper" bearing on this topic which would help me to decide. Although desirous of making a change, I would be loath to abandon (in spite of its faults) the belt and pulley, which are easy to replace, for the more modern styles with their many bearings, all of which it seems must be made to run on rollers or balls—a lot of small stuff liable to make trouble at the most inopportune times—and also require to be kept well lubricated.

"A JAY."

[For the special case where the owner does not mind the somewhat unsightly appearance which it is hard to avoid with belt driving, and is familiar with the proper treatment of belts, and where there is comparatively little hill climbing to do, it is doubtful whether a more suitable transmission system than the belt system could be found. It is undoubtedly cheaper and lighter than other transmission systems, and when broken or out of adjustment can always be fixed on the road in a comparatively short time.

The bearings of transmission gears of the sliding gear and planetary type need not be, and very seldom are, ball or roller bearings; in fact, there would be more need for anti-friction bearings on the shafts of a belt transmission, as the necessary belt tension results in considerable bearing pressure.—Ed.]

Hawaii's Attractions for the Auto Tourist.

HONOLULU, T. H., November 25.

Editor HORSELESS AGE:

With a view to attracting visitors from the United States, the Chamber of Commerce and Merchants' Association, assisted by the Territorial Government, is making a determined effort to place before our fellow American citizens on the continent the many attractions of these islands. While they do not offer to automobilists the long tours available on the continent, nevertheless the change of scenery and the many new things to be found here make this group worthy of their attention. The roads on the island of Oahu are good, offering hill climbers especially every facility for exercising their skill. Gasoline and good lubricating oils are readily procurable; but anyone bringing an automobile here should supply himself with a good stock of spare parts, as it is sometimes two or three months before the same can be procured. Ordinary repairs can be effected here, there being a shop in Honolulu especially devoted to this purpose. We have first-class hotels and transportation service, and can offer to intending tourists as good accommodations in every respect as can be found on the average.

C. S. WIGHT.

The Questions of Weight and Accessibility.

Editor HORSELESS AGE:

Your reply to M. E. Dicus, page 584, issue of December 2, indicates you have forgotten the weight of a Duryea vehicle. These phaetons, equipped with top, tools and everything needed for touring, weigh less than 1,000 pounds, so that if your correspondent is willing to leave off top and use smaller size wheels, as is common, he can readily reduce the weight below 900 pounds without making other changes. These vehicles are provided with capacious luggage box and every part is so accessible that it can be removed and replaced on the road or anywhere else without special tools or shop facilities and the replacement is in most instances a matter of such a short time as to fully meet the needs of your correspondent.

The entire transmission gear can be removed in fifteen minutes and replaced in eleven minutes, this having been done by actual test by a man who had not previously done this work, although fully familiar with the vehicle; and no previous preparation, such as removal of parts of the vehicle, had been made. An exhaust valve can be removed in ten minutes, cam shaft in five, crank shaft in half an hour, rear sprocket and either half of the balance gear with corresponding axle or sleeve part in fifteen minutes. The carburetor can be taken out in ten minutes, the magneto in twenty and the steering mechanism is so arranged that the position of the load does not affect the steering.

CHAS. E. DURYEA.

Designations of Models.

CLEVELAND, December 12.

Editor HORSELESS AGE:

Here is a matter apparently insignificant, but which it appears to me is of much importance, and which I should be pleased to have you discuss in your editorial columns.

Following the example set by the bicycle manufacturers, makers of motor vehicles are designating their cars by the year of manufacturing, as "1902," "1903" and now "1904." We have noticed how firm a hold this method of distinguishing one type of car from another has taken on the motorist public. It seems to us that this is unwise, for several reasons. Speaking for the Peerless Motor Car Company, I can say that the main reason is this: We do not think it necessary to wait a year before making, in our cars, any improvements which we believe to be warranted. Neither do we think it good policy to discard a feature already proven valuable, just because it happens to have been used on the car the year before.

Accordingly we are distinguishing our styles of cars by types rather than by year names. What do you think of this and the argument advised above? I should be pleased to see the matter given some public consideration.

HORACE BARNES.

[The question will be discussed in our next issue.—Ed.]



Nut Fastening and Locking Means.

Owing to the vibration to which all parts of automobiles are subjected there is a strong tendency for screws and nuts to rat-

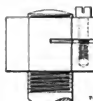


FIG. 1.



FIG. 2.

tle loose and come off, and how to prevent this is a problem that confronts many an owner. In the lower priced cars, particularly, the means provided to prevent this trouble are generally inadequate, and sometimes no attempt is made by the manufacturer to prevent the possibility of nuts and bolts being lost.

The loosening of nuts by vibration may be explained as follows: The nut is naturally a fairly loose fit on the threaded part of the bolt, but when drawn up tight it will resist a considerable force applied to a wrench to unscrew it, owing to the friction due to the lateral pressure on the thread. However, when the nut is subjected to its maximum strain it will elongate, either temporarily or permanently, or the material under the bolt head or under the nut may crush. Then the side pressure on the thread is removed and the vibration readily accomplishes the rest. Therefore, to guard against a nut coming loose, the bolt, its head and nut should be chosen of liberal dimensions in proportion to the strains they have to bear. The nut on a long bolt will jar loose more easily than on a short bolt, and a nut with coarse thread more easily than a nut with fine thread.

Shopmen are familiar with numerous simple methods of securing a nut against loosening by vibration, most of which are, how-

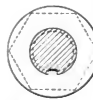


FIG. 3.



FIG. 4.

ever, too unreliable or for other reasons not applicable in automobiles. The simplest of all consists in battering up the thread with a centre punch at several points where the screw projects from the nut. Another consists in riveting over the projecting part of the screw. The first of these is too unreliable and the second is inapplicable where the nut requires to be removed and replaced occasionally.

Another method practiced to some extent in machine shops consists in sawing into the nut parallel with its base, at about the middle of its length and about half through. A hammer blow is then struck the nut to bend the two portions separated by the saw cut together. When the nut thus sprung out of shape is screwed on to the bolt the spring action of the bent part will tend to clamp the nut on the thread and prevent its jarring loose.

Sometimes, instead of bending the portions separated by the saw cut together they are drilled and tapped respectively, parallel with the axis of the nut, for a small screw, as shown in Fig. 1. After the nut is screwed in place the small screw is put in and screwed up tight, which causes the thread of the bolt to be clamped in the same manner as when the portions separated by the saw cut are bent together.

As the initial loosening of a nut is generally the result of overstraining the bolt, a strong, flexible washer, or string washer under the nut, may act as a preventive. Such washers are used in some classes of work, and generally consist of one or two convolutions of a helix formed of this flat metal strip. A variation of this spring washer is shown in Fig. 2. It will be seen to consist of an ordinary washer split along a radius line and with the edges of the split turned in opposite directions. These edges are quite sharp and are slightly hardened, so they will dig into the metal surfaces with which they are in contact, and prevent the nut from turning off. The objection to this method of securing nuts is that once the nut is in place it cannot be removed except by spoiling either the nut or the washer.

Another method of securing nuts consists in the use of lock nuts, jam nuts or check nuts. The regular nut is first screwed on to the bolt and a second nut is then screwed on top of this. In this manner a side pressure on the thread is produced which is at most only little affected by any elongation of the bolt or crushing of the supporting material below the nut or bolt head. Hence the tendency of the nut to jar loose is greatly reduced. The two nuts are usually of unequal thickness, but while theoretically the outer one or lock nut should be the thicker, in practice the inner or regular nut is usually made the thicker.

Sometimes the bolt is provided with a longitudinal groove or slot, and a washer with an internal projection fitting in the groove is placed between the nut and lock nut, as shown in Fig. 3.

SELF LOCKING NUTS.

Innumerable patents have been taken out for self locking nuts. Fig. 4 shows a nut of this kind which has been sold for automobile purposes. It consists of two parts—the inner part or nut proper, and the outer part or hexagon. The nut is split and its outer edges are slightly inclined or tapering. The hexagon is provided with a tapering opening through it of approximately the same form as the nut. The nut will, however, not go to the bottom of the opening of the hexagon, the smallest section of the opening in the hexagon being larger than the smallest section of the nut.

The wrench is applied to the hexagon and the nut screwed up. When the hexagon part abuts against the part through which the bolt passes and the turning is continued, the nut is forced into the hexagon, and owing to the tapered sides is compressed and securely clamped on the thread at the same time that the bolt is drawn up. The pressure between the tapered walls may be resolved into two com-

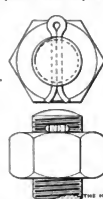


FIG. 5.

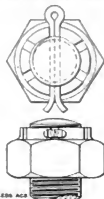


FIG. 6.

ponents, one parallel with the axis of the bolt, which draws up the bolt, and the other in a plane perpendicular to the axis of the bolt, which clamps the nut on the bolt thread.

SPLIT PINS.

The most common fastening device for nuts on automobiles is the split pin or cotter pin. A split pin may be applied in two ways, as shown in Figs. 5 and 6 respectively. In Fig. 5 it is simply passed through a hole through the bolt. When applied in this manner it will prevent losing the nut but will not prevent its coming loose. The method shown in Fig. 6 is preferable. Here a so called castelated nut is used—a nut with a cylindrical axial extension, provided with an even number of radial slots or saw cuts. The split pin passes through two of these slots opposite each other. When thus applied the split pin will prevent the nut not only from getting lost but from jarring loose.

The very best practice seems to be to use a nut, lock nut and split pin. Care should be had that the split pin fit well in the hole through the bolt, as otherwise it is likely to be sheared off. It must, of course, also have its ends bent apart so it cannot be lost.

Where a number of cap screws are used



FIG. 7.

to secure a part in place, as for instance the upper part of a machinery case, the best method to prevent them from unscrewing is to drill a hole through the cap of each and pass a stout iron or steel wire through all of the holes, bending the ends of the wire over or twisting them together (Fig. 7.) The screws must, of course, first be screwed securely in place, to determine the proper direction for drilling the hole through them, and then the hole drilled. This method can be used wherever there are two or more screws in fairly close proximity, and if the wire is sufficiently stout it would seem to be absolutely reliable.

Different methods are applicable in different cases, and the most suitable in any particular case will readily suggest itself to those of mechanical mind. For instance, suppose a cap screw has to be locked which is located near a ridge of raised portion on the part into which it screws. Then the method illustrated in Fig. 8 is quite applicable.

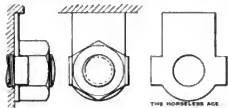


FIG. 8.

It consists in cutting a piece of heavy sheet iron or sheet steel of the form shown, and drilling a hole through it for the screw to pass through. When the screw is firmly in place the projecting tongues on the iron strip are turned up against its sides. The square end of the strip resting against the ridge or wall will then prevent the screw from turning.

Auto Delivery in Winter.

By ALBERT L. CLOUGH.

C. B. Kingsbury, who conducts the delivery service for Messrs. Smith & Murray, the proprietors of a large department store in Springfield, Mass., is using a Knox delivery wagon for the part of the service covering the outskirts of the city.

The car is of the regular single cylinder, 8 horse power "waterless" type, and is intended for a maximum useful load of 1,000 pounds. Just a month has elapsed since the wagon was put into regular commission, but during that period it has not been out of use a day, no matter what the weather conditions. Springfield has lately experienced a snowfall of 11 inches and the slush has been deep ever since, but the car has ploughed through it successfully, making its regular trips on schedule. Thirty-five to 45 miles per day is the usual distance covered, and although no very exact data is obtainable in regard to its performance,

owing to the short time it has been in use, its users are quite pleased with the showing made thus far.

The only serious difficulty which has been experienced is that of securing sufficient traction on slushy, slippery days. After trying winding the wheels with rope, which soon wore out, Mr. Kingsbury began using old rubber hose as a traction increasing device. The hose is cut into short lengths, just long enough to encircle the tire and felloe, and a small rope is threaded through each length by which the loop of hose is secured around the wheel, between two spokes. About six of these loops, spaced at equal intervals, are used on each driving wheel, and they have proved very effective in enabling the car to negotiate snowy streets, while the cost has been quite insignificant.

How Dust Is Raised

When a car is driven through still air at a speed of 20 miles per hour, air is displaced by it in proportion to its cross section. Part of the air so displaced passes over the top—part to the right and left, and part underneath the car. It is with the latter that the dust raising question is concerned. All are familiar with dust clouds raised by wind sweeping over a dusty road. With some roads a small breeze will raise dust to a disagreeable extent. The heavier parts of the dust are blown from the prominences into the hollows, leaving the former bare, but the lighter parts drift away in the form of a cloud. When a horse drawn vehicle comes along the dust in the hollows is disturbed by the animal's hoofs and the wheel tires, and the dust so disturbed is caught by the breeze and forms a much larger cloud than the breeze could effect alone. With a car having pneumatic tires a still larger amount of dust is disturbed and lifted to a height proportionate to the speed, and even on still days the artificial breeze set up plays the most important part in throwing dust to a great height and distance. The under current and the side and back currents set up by the car rushing in to fill the vacuum are the most important. The same thing noticed in the swirling eddies in the rear of a broad sterned boat takes place in connection with the air disturbed by a car. Therefore, while it is expected that the size and shape of the pneumatic tires used will have their effect, the shape of the car, the squareness of its stern, and the sectional area of the air inlet and exit are expected to play their parts. The dust raised by the tires is expected to be a definite quantity, but if the air currents are small the dust will not rise high and will quickly settle, whereas if the draughts are larger the contrary effects are to be expected.—From a Lecture on "The Dust Problem" before the A. C. G. B. I.

According to a contemporary, the oil drippings from motors have a most injurious effect on asphalted roads, as the oil soaks into the asphalt and softens it.

OUR FOREIGN EXCHANGES.



The Automobile Club de France is organizing an official tour to Germany to witness the Gordon Bennett race there. It is open only to members of the club.

The British Automobile Commercial Syndicate held its annual banquet on Thursday, November 26, at the Hotel Cecil, London, at which nearly 100 importers and agents attended. One of the speakers was M. Clement, of Paris.

The Automobile Club of South Africa held its first endurance run on November 9 from Cape Town to Houw Hoek and return, a distance of 100 miles. Among the starters were three American cars, an Orient buckboard, an Oldsmobile and a Rambler.

The date of next year's Gordon Bennett race will probably be fixed for the end of June or beginning of July. It is intended to organize in connection with the race an "automobile week," comprising a variety of events, and as at this time the Homburg season is in full swing it is expected the meeting will be a great success as a social event.

A company has been formed in St. Petersburg, with a capital of 3,000,000 rubles (\$2,500,000), for the establishment of a regular passenger and goods service of motor cars between Novorossisk and Sukhunkalch on the Circassian coast, a distance of 270 miles. The company has obtained a Government concession for a period of twenty years, with power to extend its field of operations.

According to the *Autocar*, until about two years ago, when the King set the fashion of using covered or partly covered autotocs, automobilists seemed to evince a strange apathy regarding the use of hoods or canopies. *Motoring Illustrated* says that the statement that King Edward has ordered a 65 horse, six cylinder French car, if true, will tend to make high power road races very fashionable.—These notes may throw some light on where auto fashions originate—English auto fashions.

The last bac and delivery wagon trials held in Paris were more or less of a failure, the public showing very little interest in them. At a recent discussion of the Technical Commission of the A. C. F. the matter was thoroughly threshed out, and it is proposed that next year the trial shall take the form of a six days' run from town to town. The competing vehicles will have to traverse a course approximating not less than 750 miles, and in addition to the regularity of running, the state of the vehicles at the finish, the fuel consumption, etc., will largely determine the winners.

NEW VEHICLES AND PARTS.

The Double Cylinder Knox Car.*

By ALBERT L. CLOUGH.

The product of the Knox Automobile Company, of Springfield, Mass., for the season of 1904 includes six styles of passenger vehicles, as follows: The four passenger "Lenox" touring car of the tonneau form, the "Leroy" touring car of survey design, also for four passengers, and the two passenger "Touraine" car of runabout type, these three cars being equipped with 8 horse power, single cylinder, "waterless" engines, together with the higher powered line, consisting of the "Tudor" touring car, a tonneau with divided front seat; the "Tuxedo," a survey model, with divided front seat, both of which cars are intended to carry four, and the "Touraine" touring car for two passengers, these three cars being provided with 16 horse power, furnished by a double cylinder engine of the well known "waterless" type. There is also a line of delivery wagons intended for various capacities. These various forms of bodies are all applied to two chassis, known as the single and double cylinder mechanisms. As the single engine equipment has been known to the public for several seasons, a full description of the double cylinder equipment will be of more interest, and will serve in a general way to describe the lower powered car.

*A plan view of the Knox two cylinder chassis appeared in our issue of October 7 last, to which those particularly interested in this article are referred back.

THE MOTOR.

The motive power consists of a double opposed cylinder, horizontal engine of 5 inch bore by 7 inch stroke, cooled by the Knox "waterless" method. The cylinders are offset, and the combustion chamber of each cylinder carries two upwardly extending projections which are securely bolted to the cross iron of the angle iron frame, forming a double support for both head ends. A crank case, open above and not intended to be oil tight, is secured to the crank ends of the cylinders by bolts, and a light sheet iron oil guard covers it. It has a drip hole in its bottom and it is intended that the oil which passes the piston shall drip out and carry away all entering dust or metal particles. The entire surface of the cylinders and of the combustion chambers is studded with threaded steel pins, which are screwed into holes drilled and tapped in the external surfaces of these parts. These pins are placed very closely together and there are the surprising number of 1,750 in each cylinder. They must present an enormous radiating surface.

The double throw crank shaft is machined out of a single steel drop forging. It is 2 inches in diameter in the bearings and $2\frac{1}{4}$ inches at the crank pins and runs in babbitted boxes. It carries carefully adjusted counterbalances to minimize the vibration.

Bronze is the material used for the connecting rods, which are of very heavy I section. Babbitt bearings are used on the crank pins and ground and hardened steel bushings in the connecting rods carry the hardened wrist pins. All wearing parts of the engine, such as the cylinders and piston

rings, are ground to a perfect fit, and in general throughout the machine all parts are ground and hardened where desirable. On the right hand end of the crank shaft is carried the balance wheel, which is of solid web construction, 20 inches in diameter and weighing 168 pounds. Between the balance wheels and the crank case is keyed a steel spiral gear of unusually liberal size which meshes with a ball bearing spiral gear of twice the number of teeth to give motion to the half speed shaft. This shaft runs in plain bearings carried by aluminum bronze brackets bolted to the steel cross frames, and extends slightly beyond the engine in each direction, furnishing motion not only to the contact device and exhaust valves, but to the cooling fans.

THE VALVES.

The inlet valves are located on the left hand side of the cylinders and the exhaust valves on the right hand side, directly opposite. All valves are of 2 inch diameter in the clear, 30 per cent. nickel steel being used for the exhaust valve, which is machined from a solid forging. Ordinary mild steel is used for the inlet valve, which is formed from a single forging. The inlet valve has a lift of $5\frac{1}{32}$ of an inch and the exhaust valve a rise of $\frac{3}{4}$ of an inch.

Special attention has been paid to securing easy removal of the valves, and, with this end in view, the housings are attached to the cylinders by aluminum bronze clamps. To remove the inlet valve housing, it is only necessary to remove the single clamp bolt; and to remove that covering the exhaust valve, the loosening of the clamp bolt and two cap screws which secure the muffler pipes is all that is necessary. The inlet valves are automatic in operation. Hardened steel cams keyed to the half speed shaft operate the exhaust valves. Upon the exhaust cam bears a large hardened steel roller fixed to one end of a bell crank lever, the other arm of which operates the valve through a straight line link. The exhaust valve spring is attached to an arm on the bell crank and is thus not exposed to any heat.

IGNITION.

Toward its forward end the half speed shaft carries the ignition cam, which is of circular form, carrying two diametrically opposite depressions into which the follower on the contact spring drops twice each revolution of the secondary shaft, or once each revolution of the engine. The contact spring is of remarkably heavy steel, and carries a large hard platinum point, which makes contact with another platinum carried by a stationary insulated stud entering the contact box through a fibre bushing. The contact box is mounted on the shaft bearing and is of aluminum. The box may, of course, be rotated on its mounting to vary the spark lead. The cam action is such as to produce a very quick break and a very short period of contact, which enables a coil vibrator to be dispensed with and conduces to battery economy.



FIG. 1—KNOX AIR COOLED CYLINDER, INTERRUPTER AND SPARK PLUG.

There being but one electrical connection made and broken in the contact box, it is necessary to connect the two spark plugs in series with the secondary coil, and thus a spark passes in both cylinders whenever one is desired in either. This is no objection, however, as the spark occurring in the idle cylinder will occur at the end of its exhaust stroke and produce no interference. A Dow coil is used, and a spark plug of special construction and of unusually large dimensions is employed. Its porcelain insulation is of a degree of thickness and strength not found in standard plugs. This is also true of the sparking terminals themselves, and the plug takes a hole considerably larger than required by the ordinary plugs on the market. Any ordinary plug may be used in an emergency by the use of a screw bushing.

Eight dry cells are carried, four being used at a time, and both the coil and the batteries are so disposed in the bonnet as to be out of the reach of moisture. All wires are carried in soft rubber tubing, are provided with copper terminals and are so located as to be out of the way of moisture, oil or excessive heat.

COOLING SYSTEM.

Returning to the description of the engine, the forced air cooling system is of interest. Each end of the secondary shaft carries a pulley, and screwed directly into the centre of each cylinder head is a stud which carries the fan and its pulley, together with an adjustable arm which carries a binder pulley. Over these three pulleys passes a specially prepared leather belt and gives motion to the six bladed propeller fan which delivers its blast directly upon the combustion chamber and thence allows it to pass along the cylinder.

LUBRICATION.

The lubrication system of the Knox cars is quite novel, in that non-fluid lubrication is employed in a great many places where oil is customarily used. On each end of the crank shaft is carried a large compression grease cup and a channel is formed in the crank shaft and through the crank to the crank pin bearing, where an opening is made. There is also an opening at the main bearing. It is only necessary to screw up the grease cup, thereby forcing the semi-solid lubricant into the main bearing and the crank bearing. These compression cups are also provided for the bearings of the fan mechanism. A very large sight feed lubricator supplies oil to each cylinder, and its feed is such that the lubricant drips into the channel formed by the connecting rod casting, and runs back to the wrist pin bearing, where a hole is drilled that allows it to reach the wrist pin. All bearings of the running gear, and even the differential, are packed with non-fluid lubricant, instead of oil, and it is claimed that great economy results from the use of this lubricant, as well as a freedom from unnecessary dirt. It is easy to give the compression cups a turn at frequent intervals, and it becomes habitual after a short time

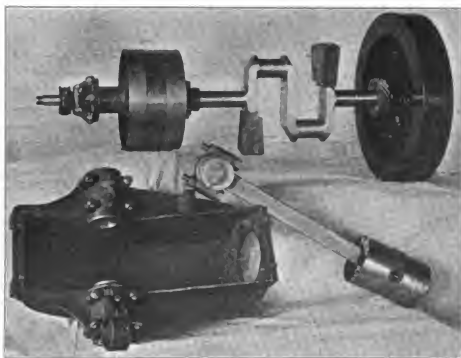


FIG. 2—CRANKSHAFT WITH FLYWHEEL AND TRANSMISSION; CRANK CASE, PISTON AND CONNECTING ROD.

THE CARBURETOR.

The carburetor is carried on the left hand side of the angle iron frame and is connected through a throttle and auxiliary air inlet with the brass mixture pipe leading to both cylinders. The air pipe is located in close proximity to the front cylinder, and is full of small perforations which draw warm air from around the heated radiating pins. The Knox carburetor is such a small and simple device that in appearance it would seem to be inadequate to its purpose. This, however, is evidently not the fact, as the Knox Company has used it most successfully without change for a number of years. It consists of a very small float chamber carrying a little float horizontally pivoted at one side, which actuates a self centering needle valve. The spraying nozzle delivers its gasoline directly into the throttle pipe, and there is no separate mixing chamber, as in many carburetors. The throttle, when operated, regulates the admission of auxiliary air in a manner which is determined by experiment to be correct and insures a perfect mixture at all speeds and degrees of throttle opening.

One feature of the Knox vehicle which has been retained for a number of years is the inter-connection of the throttle with the spark advance, and it is claimed that practice has justified this arrangement and that the average user can get better results by having the spark automatically advanced as the throttle is opened than by having these two functions separate and capable of being mishandled relatively to one another. It is so arranged that the throttle is fully opened before the spark is advanced to its extreme position, so that when the engine begins to slow down on a hill it is possible to reduce the spark advance and

favor the engine without shutting off the gas or changing the mixture. The throttle lever is located on the steering column and in its closed position just allows the engine to keep turning.

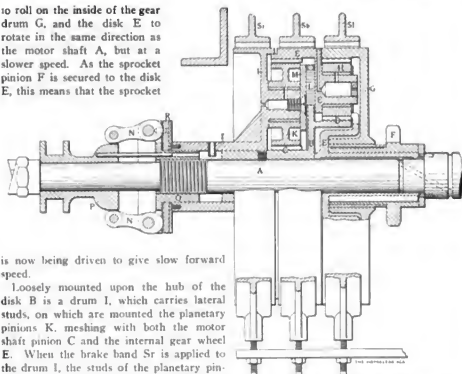
THE CHANGE GEAR

The Knox change speed gear (Fig. 3) is carried directly on the engine shaft, is of the planetary type and furnishes two speeds forward and a reverse. The gear is supported by a substantial brace which connects the frame on the left hand side with it and the engine crank case. There are three drums in the gear, encircled by steel straps, S.S.S. leather lined, and these straps, when tightened, secure the slow speed forward and the reverse, while the third one is the foot brake drum, the strap of which is tightened by a pedal.

Referring to the cross sectional view of the change gear herewith, A is an extension of the engine shaft which at its outer end carries the ratchet jaws with which the starting crank engages. Secured to this shaft by keying and by means of a set screw is a disk B, which is provided with two gear pinions, C and D. Loosely mounted upon the shaft is a drum E of rather peculiar construction. The web of this drum passes around the toothed flange D, surrounding it both inside and outside, but at the outside is cut away at several places to let pass the planetary pinions H which mesh with the pinion D. The outer flange of the drum is provided with internal gear teeth, and the drum has keyed to it the sprocket pinion F from which the power is transmitted by chain to the rear axle.

Loosely fitted upon the hub of the sprocket F is an internal gear drum G. When the band brake SI is applied to this drum the pinion D causes the planetary pinion H

to roll on the inside of the gear drum G, and the disk E to rotate in the same direction as the motor shaft A, but at a slower speed. As the sprocket pinion F is secured to the disk E, this means that the sprocket



is now being driven to give slow forward speed.

Loosely mounted upon the hub of the disk B is a drum I, which carries lateral studs, on which are mounted the planetary pinions K, meshing with both the motor shaft pinion C and the internal gear wheel E. When the brake band Sr is applied to the drum I, the studs of the planetary pinions K remain stationary, and the rotation of the pinion C causes the rotation of the drum E in the opposite direction, at a reduced speed. Thus the reverse motion is obtained by applying the band Sr to the drum I. It will be noticed that the studs on which the planetary pinions revolve are formed integral with the disks which support them, are of large diameter and hollow to facilitate lubrication. There is, therefore, little chance that the pinions will get out of proper mesh.

Evidently, since the sprocket F is rigidly connected to the drum E, applying the brake Sb to the drum E has the effect of checking the motion of the car; in other words, the brake Sb is a vehicle brake.

The high speed is obtained by clutching the whole gear together, as usual, but the construction of the high speed clutch differs materially from that in use on any other car. The disk B already referred to is provided with openings near its outer circumference, in which are inserted wood

FIG. 3—SECTIONAL VIEW OF CHANGE GEAR.

blocks L. These wood blocks may be clamped between the web of the drum E and the disk M, secured to the drum I by machine screws. Secured to the shaft A is a bracket O on which are pivoted two eccentric levers NN. These eccentrics may be rotated around their pivots by shifting the conical collar P lengthwise of the motor shaft, when they will force the disk R against another disk on the hub of the drum I, thereby forcing the disk M against the wood blocks L, solidly clamping the wood blocks between the disk M and the web of the drum E. Since the disk B is keyed to the shaft A, and the sprocket F keyed to the drum E, it will be readily seen that clamping the disk B and drum E together is equivalent to securing the sprocket pinion F to the shaft, thus insuring direct drive from the motor shaft to the rear axle.

Both the high and low speeds are operated by a hand lever on the steering

column, just below the steering lever, which communicates its motion through one of the three concentric members of which the steering column is formed. The transmission is lubricated by oil through a number of easily accessible oil holes. The reverse is operated by a pedal and is spring returned. The left hand position of the clutch lever engages the low speed and in its right hand position the direct high speed gear is thrown in.

A lever on the left side of the body operates the powerful emergency brake. This is of the externally expanding type and acts upon the bronze drum carried by the differential casing, forcing the cast iron shoes against the bronze drum through the action of an adjustable toggle joint. It is so arranged that the brake will stay in the "on" position until released by hand.

RUNNING GEAR FRAME.

A rectangular frame of 2x2½x5-16 inch steel angles serves to support all parts of the mechanism. The cross angle irons are attached both to the vertical and horizontal portions of the side angles, in order to secure the utmost rigidity, and the whole is hot riveted. Side springs have always been a characteristic feature of the Knox design and in this car these springs are of 2 inch oil tempered steel. The lower leaf of the construction is of untempered steel three-eighths of an inch thick and the ends of this are electrically welded to the pins, which swivel in the front and rear axle fittings in order to prevent torsional stresses upon the springs and confer upon the gear the utmost flexibility. Six leaves are used to form the spring.

Aluminum bronze castings attached to the angle iron frame on each side carry the forward ends of the adjustable distance rods and their rear ends are fixed to the spring saddles over the rear axle. These spring saddles carry rubber buffers to receive the blow of the rear of the body in cases of extreme spring deflection.

AXLES AND BEARINGS.

A 1½ inch gun metal steel shaft forms the through rear axle and the right rear wheel is fixed upon it. The left wheel is carried upon a 3 inch sleeve of the same metal. The left hand bevel gear of the differential is keyed to the sleeve and the right hand gear to the through shaft. This brings the differential close to the left hand spring, and the use of the through axle results in an extremely substantial construction. Bronze is used for the gears of the differential, the sprocket and the differential brake drum, and the pinion frame carries two steel pinions. All these gears are of unusually liberal dimensions, and the differential is fully encased and packed with semi-solid lubricant. Means are provided for taking care of the end thrust due to the action of the bevel gears. Timken roller bearings, consisting of two cages of inclined conical rollers bearing in conical roller races, are used under each rear spring, and are packed with non-fluid lubricant, and

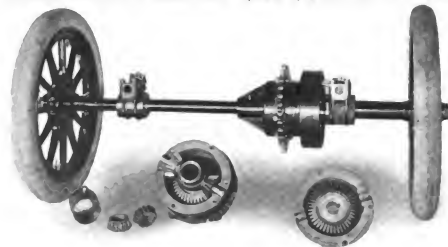


FIG. 4—REAR AXLE, AXLE BEARINGS AND DIFFERENTIAL GEAR.

artillery wheels with bronze hubs are used. The wheels are 32 inches in diameter and are fitted with standard clincher rims carrying 4 inch tires. The tread is 56 inches and the wheel base 84 inches. A $\frac{3}{4}$ inch Baldwin detachable chain of $1\frac{1}{4}$ inch pitch is used, and, as it is quite long, may be run loose enough to insure its quiet and efficient action.

STEERING GEAR.

The front axle is of an inverted U section, stiffened by a truss beneath and provided with stiffening ribs near its outward extremities. Vertical steering pivots of

eight inch holes, around which is a 5 inch pipe. These two pipes are flanged into heads, which are perforated with a large number of very fine holes to give the gases egress from the outside compartment.

The gasoline tank is carried under the front seat and has a capacity of 18 gallons. It is constructed of heavy galvanized iron, reinforced in both directions with iron bands. There is a small depression made in its bottom and into this screws the draw off plug. Any water or sediment collecting in the tank will seek this depression and may easily be removed. The gasoline valve

form a film over the inside of it, thus securing a rich mixture. A quarter turn of the crank is all that is necessary to set the engine in motion.

The equipment here described, with tonneau body and necessary supplies weighs about 2,325 pounds. Great attention has been paid to accessibility of all parts, the provision of adequate carrying space, easy riding qualities and a remarkable degree of simplicity in construction and operation. The body may be removed from any of these cars by the removal of a few bolts and the disconnection of the gasoline pipe and electrical connections. The usual gear is such as to provide for a speed of 20 miles per hour at 650 revolutions of the engine, which may readily be speeded up to 1,200, when a rate of over 35 miles per hour is attained.

New Upton Touring Car.

The Upton Machine Company, of Beverly, Mass., will exhibit at the Madison Square Garden Show a new design of tour-

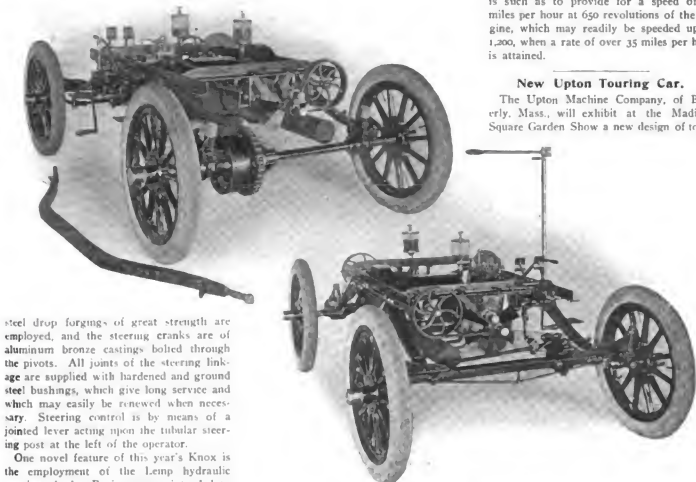


FIG. 5.—REAR VIEW AND FRONT VIEW OF KNOX CHASSIS.

steel drop forgings of great strength are employed, and the steering cranks are of aluminum bronze castings bolted through the pivots. All joints of the steering linkage are supplied with hardened and ground steel bushings, which give long service and which may easily be renewed when necessary. Steering control is by means of a jointed lever acting upon the tubular steering post at the left of the operator.

One novel feature of this year's Knox is the employment of the Lemp hydraulic steering check. By its use are intended to be combined the quickness and freedom of action of the lever and the irreversible feature and safety of operation which characterize the wheel method.

In the Knox construction the check is carried directly upon the front axle and the action of the check is such as to firmly hold the steering wheels in position against any tendency toward deflection arising from road obstructions, but to permit of their easy motion by the lever whenever the oil bypass in the check is opened by the slightest motion of the steering hand in either direction. The Lemp steering check has been fully described in these columns.

ACCESSORY PARTS.

The muffler is very long and extends nearly the whole length of the vehicle on the right hand side. It is constructed of a 2 inch iron pipe perforated with 200 one-

screws into a fitting in the tank wall and carries with it a conical strainer of very fine gauze, which is solid at its lower portion, so that the tank can never be drawn down through the strainer to less than one-half inch from its bottom. These arrangements make the chance of dirt entering the carburetor with the gasoline very slight.

Instead of using relief cocks to enable the engine to be cranked easily, a small lever is provided in the floor which acts to push both inlet valves off their seats, and assists in the starting operation, which is performed by a crank of the usual type engaging with a ratchet on the left hand end of the crank shaft. It is customary in starting to operate a small lever in the foot-board that allows a few drops of gasoline to enter the air pipe of the carburetor and

ing car with a four cylinder $4\frac{1}{2} \times \frac{1}{2}$ inch engine giving 16 horse power at 850 revolutions per minute, fitted with mechanically operated inlet valves and make and break ignition. The car has a 90 inch wheel base, weighs 2,500 pounds, has a double chain drive and is equipped with $3\frac{1}{2} \times \frac{1}{2}$ inch tires.

Gray & Davis, of Amesbury, Mass., have recently brought out a new style of lamp, known as the "bullet reflector" lamp. It is to be used with a separate generator, has a one-half foot burner and is $8\frac{1}{2}$ inches in diameter and 12 inches long. It has a full polished brass finish, is fitted with a lens mirror searchlight reflector and takes a large size fork bracket.

Columbia Mark LX Electric Runabout.

By ALBERT L. CLOUGH.

The Electric Vehicle Company, of Hartford, Conn., are bringing out for the season of 1904 a light electric runabout, which possesses some novel features. It is known as Mark LX. The vehicle is intended for two persons only, and a 40 mile traveling capacity is claimed for it under the conditions where electric vehicles are usually employed. It is obvious that in order to reduce the dead weight of an electric vehicle to its minimum without sacrifice in traveling capacity, the running gear and body must be lightened just as much as is consistent with safety and durability, thus leaving the greater portion of the dead weight in the battery and the motor, insuring large storage capacity and great power. In order to save weight in the running gear it must be built as simply as possible, materials hav-

ing carried in standard clincher rims. Steering is by means of a side lever located on the left of the operator, and all speeds, forward and backward, are obtained by the motion of a single controller handle, located by the operator's side. The body is of neat design and takes the form of a bonnet in front and a box of attractive shape in the rear, these two portions each carrying one-half of the battery equipment, which consists of twenty cells of 11 P. V. Exide battery. Edison cells may be used if desired. This battery has a capacity of 120 ampere hours at a 30 ampere hour discharge rate.

The motor is of six pole construction, manufactured by the General Electric Company, is completely enclosed, and rated at 30 amperes at 40 volts. It is carried entirely in the body, the practice of supporting the motor upon the rear axle having been discarded in this construction for the reason that it is believed that hanging the

motor on the axle, where it does not benefit by the action of the springs, tends to rapidly deteriorate the motor itself through constant vibration and to prove a heavy strain upon the tires, since its weight is carried upon them directly without the intervention of the springs. It is also believed that in order to carry the motor on the axle with safety the axle must be heavier than would otherwise need be the case. The motor in this case is flexibly supported by a shaft passing through bearing lugs

cast in the frame, the points of suspension being sufficiently far apart to furnish a very rigid support.

The armature pinion is of steel and is of the herring bone type and meshes with another herring bone gear of bronze, carried on the intermediate shaft. These gears are fully enclosed and should operate with almost no noise. The outer end of the intermediate shaft carries the driving sprocket, which transmits to the rear axle by means of a large Baldwin chain. An adjustable distance rod holds the countershaft at a constant distance from the rear axle. Lubrication of the motor bearings and countershaft bearings is by oil soaked waste, which is carried in a small pocket on each bearing, the pockets being supplied with spring closed covers, which cannot be lost or left open. The controller handle is formed of light steel tubing, flattened into the desired form of a lever, and moves in two slots having an offset between them. The forward slot gives the three forward

speeds and the rear slot the two backing speeds. The first speed is obtained by grouping the two sets of battery in parallel and connecting them in series with the motor and a resistance, which latter is carried in a frame underneath the body. On the second speed the two batteries are acting in parallel on the motor without dead resistance, and on the third the two sets are in series on the motor. The two backing positions correspond to the first and second of the forward positions, with the field commutated. The controller is entirely self contained in an aluminum frame; all its contacts are of the best quality of hard drawn copper, of liberal size, and the action in passing from one point to another is rapid and uncontrolled by the handle. The connections have been so simplified that but seven cables enter the controller.

The differential is of the bevel gear type, thoroughly enclosed and running in oil, and the hubs of the wheels carry drums, upon which act double acting brakes, operated by a pedal. The vehicle weighs 1,200 pounds and has a speed of 15 miles per hour.

The Lyman & Burnham Twelve Horse Power Light Touring Car.

A new gasoline touring car has lately been placed on the market by Lyman & Burnham, of Boston, which is equipped with a 12 horse power motor and carries five people. The bodies are built of wood with aluminum panels and are the work of Chauncey, Thomas & Co., of Boston. The machinery was built by the Fore River Ship and Engine Company, of Quincy, Mass.

The frame is of angle steel, riveted together, and the engine and transmission are hung by steel plates and angles to this frame. The equipment consists of an upright two cylinder, high speed motor, placed in front. The cylinders have a bore of 4½ inches. The cranks are set at 360 degrees, and are suitably counterbalanced. The splash system of lubrication is used. The throttle control consists of a special form of valve, located in the cylinder casting and surrounding the inlet valves on each cylinder, and these valves are worked by a foot pedal in front of the operator. This throttle device is claimed by the makers to be extremely sensitive. Water circulation is effected by means of a centrifugal pump. The crank case is of aluminum, and has large side plates for easy accession to the cranks, etc.

The ignition is by jump spark by means of a Splitdorf dashboard coil with vibrator. A feature about the breaker box is that it may be instantly removed bodily from the engine without the use of any tools whatever. The Pignot plugs and De Dion carburetors are used.

The transmission is of the sliding gear type with two speeds ahead and one reverse. The gears cannot be thrown in or out without releasing the clutch. One pedal



NEW COLUMBIA ELECTRIC RUNABOUT.

ing the greatest strength in proportion to their weight must be used, and the metal must be placed exactly where it is needed, with no surplus where it is not required. In fact, each portion of the gear should carry the same surplus of strength under conditions of use. The engineers of the Electric Vehicle Company have endeavored to embody these ideas in a very careful manner in this new runabout, and have attained a structure each element of which has been carefully worked out according to considerations of strength and usage.

The vehicle frame consists of oak sills reinforced by 1½ inch by 1½ inch standard angle steel. All springs are of the semi-elliptic type and 36 inches in length. The front springs are shackled at their rear ends and the rear springs at their front ends. A Collins axle with plain bearings is used in front and a large tubular axle equipped with "American" roller bearings is employed in the rear. The artillery wheels are of 30 inches diameter, shod with 3 inch tires,

operates the double acting brake on the rear hubs; another, connected to it, releases the clutch at the same time. The transmission is extremely simple and runs in an oil bath. An auxiliary brake is provided, which is applied by throwing the high speed lever ahead.

The drive is chainless through bevel gears to a live rear axle, which is fitted with the American Roller Bearings Company's bearings and ball thrusts. The wheels are 30 inches, fitted with Goodrich clincher $3\frac{1}{2}$ inch tires (heavy type). The wheel base is 78 inches. The springs are semi-elliptic, wide, very long and flexible.

Steering is by means of a Brown-Lipe gear (heavy pattern), and the spark shifter and carburetor adjuster are placed on a quadrant under the steering wheel.

St. Louis Light Delivery Wagon.

Like several other manufacturers of gasoline runabouts, the St. Louis Motor Carriage Company has recently turned its attention to light delivery wagons, and has produced the vehicle shown in the cut herewith. It is equipped with a to horse power $5\frac{1}{2} \times 6$ inch engine, built together in a unit with the transmission gear. The wagon is equipped with 32×4 inch pneumatic or $32 \times 2\frac{1}{2}$ inch solid rubber tires, as desired. The body space is entirely available for carrying load, none of the machinery projecting above the floor. The gasoline tank is located in the rear half of the hood and is of 10 gallons capacity, which is more than enough for an entire day's run. The weight of machine is 1,800 pounds. The wagon is designed to carry a load of 1,000 pounds. It is claimed to be capable of surmounting any grades which a horse vehicle is expected to climb, and to be able to do the work of two one horse delivery wagons. In winter the wagon is equipped with removable glass front and side doors, which make it possible to run regardless of weather conditions.

Duckworth Chains.

The Duckworth Chain and Manufacturing Company, of Springfield, Mass., are producing automobile chains of both the block and roller type, in all sizes commonly used.

In the block chain, either a straw color or nickel finish is furnished on the blocks, and the sides are blued. The sizes range from five-sixteenths to half an inch in 1 inch pitch, and half inch and five-eighths inch widths are made for $1\frac{1}{2}$ inch pitch.

The roller chain is made in five-sixteenth and three-eighth inch widths for 1 inch pitch, and in half inch width for $1\frac{1}{2}$ inch pitch.

The rollers and bushings are of nickel steel in a straw finish, and the sides and rivets are of 50 carbon steel, the sides being neatly blued. The rolls and bushings are well hardened, and the bushings are of liberal size and squared on one side to prevent their turning in the side plates. All rivets are upset hot.

The following ultimate strengths are



THE LYMAN & BURNHAM TOURING CAR.

given for the various sizes: Block chains, $5-16 \times 1$ inch, 2,500 pounds; $3\frac{1}{4} \times 1$ inch, 2,800 pounds; $\frac{1}{2} \times 1$ inch, 3,000 pounds; $\frac{1}{2} \times 1\frac{1}{2}$ inches, 3,500 pounds; $\frac{3}{4} \times 1\frac{1}{2}$ inches, 4,000 pounds. Roller chains, $5-16 \times 1$ inch, 5,000 pounds; $\frac{1}{2} \times 1\frac{1}{2}$ inches, 6,500 pounds.

In addition to chains for automobile work the Duckworth Company produce special chains for motor cycle use, which are claimed to be specially adapted to withstand the severe stresses due to the action of chain connected motors.

Hercules Carburetor Floats.

The Hercules Float Company, of Springfield, Mass., are making up, upon orders only, seamless copper carburetor floats according to any specification furnished them. These floats are spun up in halves from the

best quality of copper sheet, and the two cup shaped portions are then joined in the following manner: A thin copper ring is sprung inside the edge of one half with about half its width protruding. The other half is then fitted over this, thus joining the two portions while they are being soldered. The solder is then carefully cleaned off and the whole float is electroplated with copper, which fills any interstices which may possibly exist. The deposited copper seems to combine most intimately with the sheet metal and the seam is entirely obliterated.

It is claimed that the construction does away entirely with the annoying liability of leakage sometimes experienced in the use of floats which are made in several parts, and in which soldered edges are depended upon to secure tightness. The Hercules Company guarantee to produce floats which are uni-

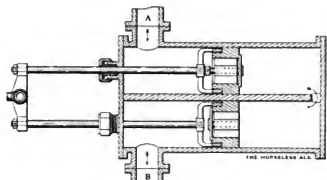


ST. LOUIS LIGHT DELIVERY WAGON.

form in weight to within one-quarter of an ounce, and of dimensions remarkably close to standard.

Carrier's Siphon Pump.

Dr. C. W. Carrier, of Desplaines, Ill., is marketing a siphon pump for gasoline cars, illustrated herewith. The pump comprises two cylinders which when finished up measure 6x4x2 inches over all; and two pistons



CARRIER'S SIPHON PUMP.

and piston rods which move in unison, both being fastened to one crosshead. The pistons are said not to require any packing. The valves are held in position by the piston rods, and are so arranged that one piston makes a suction stroke while the other makes a discharge stroke. No additional check valves are required, and if the pump should for any reason stop, the water could siphon from the tank to the engine the same as if the pump was not there. The pump can be driven either by means of a crank or an eccentric at from 30 to 300 revolutions per minute, according to the rapidity of circulation desired. The length of the stroke is $3\frac{1}{2}$ inches.

Referring to the illustration, the water enters the pump on top at A and is discharged at B. It is claimed that in cold weather all the water can be drained out and there is no

danger of freezing the pump. The pump is tested to draw water to feet and force it to feet above the pump. At 90 revolutions per minute the capacity at full stroke is to gallons per minute.

The Pedersen Pressure Feed Oiler.

J. T. Pedersen, of New York city, manufactures multiple sight feed oilers for automobiles of various designs and sizes.

In all of these the pressure causing the flow of the oil is derived from the engine exhaust. The illustration herewith is a sectional view of one of these oilers. The device consists of a rectangular reservoir with a bolted on top plate and a gauge glass (not shown) in the front wall. The exhaust gases arrive through the tube A rising in the tank, which is provided with a check

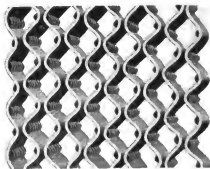
valve B at its upper end. At the moment the exhaust valve opens this check is slightly raised, and a small amount of gas enters the tank. The valve immediately closes again, under the force of its own weight and of the pressure within the tank. C represents one of the sight feeds, of which there are a variable number. From this sight feed a small tube D extends up through the tank, surrounded by another larger tube E. The tube E extends to near the bottom of the tank; the opening at the upper end of the tube D can be regulated by means of the point valve F, which passes through a stuffing box fitting secured in the top plate of the tank.

Under the gaseous pressure in the tank the oil passes up the tube E around the tube D, through the valve F and down through the inner tube D and the sight glass to the place to be oiled. With the adjusting valves located as they are in this oiler, they are not very liable to become clogged up, and if for any reason, such as dirt in the oil, this should happen, they can be easily cleaned by unscrewing the knurled adjusting screw on top, and inserting a wire clear through into the feed pipes, without disturbing any of the connections. The oilers are furnished with unions and stems ready to be soldered to the feed pipes. The tank is provided with supporting lugs.

Improvements in the Whitlock Cellular Cooler.

The illustration shows a section of the cellular portion of the new Whitlock cellular cooler. The cooler consists of a series of transversely corrugated tubes extending between a top and a bottom water tank. The corrugations of every tube are reversed with relation to the adjacent tubes, thus forming air cells running from front to back. An improvement in the construction of this cooler is also well brought out in the illustration. It consists in the formation of thousands of little points projecting into the air cells, which not only increases the surface, but also improves the efficiency of the cooler as a whole. These points are not of solid metal, but are made by drawing out the metal into minute cups, each one of which is full of water, separated from the air only by a thin wall of copper. The advantage of thus bringing the water and air into intimate contact will be understood even by the amateur.

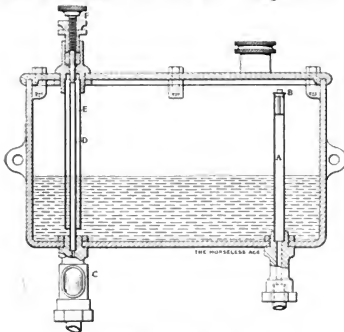
The form of corrugated tube described is said to have many advantages over other



forms of construction. It produces a veritable "cellular cooler" and gives the front of the car a neat appearance. The continuity of the tubes from top to bottom gives strength. The zigzag course of the water through the narrow, flat water spaces brings every particle into contact with the air cooled surface of the cells and insures high efficiency for the cooler; the cooling effect has, moreover, been vastly increased by the addition of the little pointed cups described above.

The Whitlock cellular cooler is made in two general styles, A and B, and there are six stock sizes of each style. The cooler is also furnished by the makers with a ball bearing fan when desired. The Whitlock Company will also soon bring out a new radiator for light runabouts.

A patent on an electrically heated handle particularly adapted for use as operating handle of automobiles has been taken out by R. A. Fliess, of New York. The handle comprises an inner core of heat insulating material (porcelain), with annular ribs and spaced apertures, on which is wound a conductor of German silver. A small current derived from the vehicle battery flows through the conductor and keeps the handle warm.



PEDERSEN PRESSURE FEED OILER.

The Cudell Steering Gear and Power Control Devices.

As an example of modern German design we show herewith several views of the steering gear and control devices used on the 12 horse power cars manufactured by the Cudell Motor Company, of Aix-la-Chapelle. In these cars the change gear lever is located below the steering hand wheel and turns in a plane parallel to that of the wheel. One advantage of this arrangement is that, with only the emergency brake lever outside the seat, there is no danger of confusing levers in case of a sudden emergency. Besides, the operation of a small lever below the steering wheel is more convenient than that of a lever outside the seat, as the hand normally rests on the steering wheel.

In the description of the Cudell transmission gear in *THE HORSELESS AGE* of April 1, 1903, it was shown that the four forward and one reverse speeds are all obtained by means of a continuous motion of the operating lever, and that motion is imparted to an operating shaft running transversely through the gear box by a rack inclined to the plane of the vehicle. This rack is connected to another rack A passing through the casing of the steering gear.

The steering motion is transmitted from

the inclined steering shaft to the steering linkage by means of a worm and gear sector, as usual. Attention is called to the method of fastening the gear sector to its shaft. This worm and gear mechanism is enclosed in an aluminum casing in two parts, bolted together. The casing is provided with stop screws R, limiting the motion of the gear sector. The casing, besides protecting the mechanism from dust and dirt, serves as a support for the steering column. The lower half of the casing is provided with a lug C, by which it is bolted to an angle iron member of the false frame. To the upper half of the casing is secured a stud D, which fastens into another frame member.

To the upper half of the worm and gear sector case is secured, by means of a flanged joint, a sleeve E with two horn shaped brackets H H. The joint between the upper half of the casing and the sleeve E is enlarged and forms a chamber in which is located the pinion F, which meshes with the rack A. It will be noted that the rack A makes an angle with the plane of the pinion F, and the teeth of either the rack or the pinion must therefore be inclined.

Securely clamped in the sleeve E is a steel tube of 1.9-1.6 inches outside diameter,

which serves as a steering column. At its upper end this tube contains a bearing sleeve, through which passes a steel tube of $1\frac{1}{4}$ inch outside diameter, by means of which the gear changes are effected. To this latter tube are secured at the upper end the gear changing lever G and at the lower end the spur pinion F. The steering column at its upper end is surrounded by a collar K with a flange notched to receive the latch pin of the gear change lever G. A plan view of this flange with its notches, and of the gear change lever G, is shown in Fig. 3. The notches corresponding to the first, second, third and fourth forward speeds are indicated by the respective numerals. The notch marked "L," between the first and second speed notches, corresponds to the position of the gear change lever when the car is at rest. The notch "R" is the reversing notch. It will be noticed that the flange is provided with a stop projection, between the notches 4 and R, which prevents moving the change gear lever beyond these positions.

On either side of the steering column is arranged a rod running parallel to it, which at its upper end is provided with a small handle. One of these handles controls the point of ignition and the other the gas throttle. The method of holding these

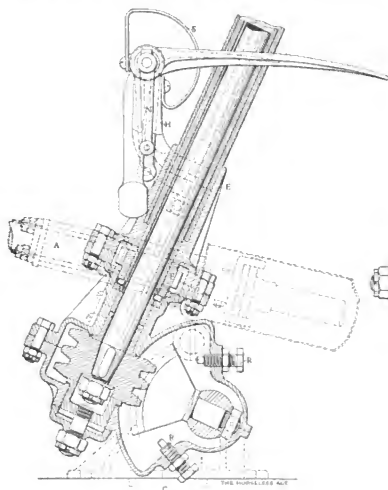


FIG. 1—SECTION THROUGH CUDELL STEERING COLUMN.

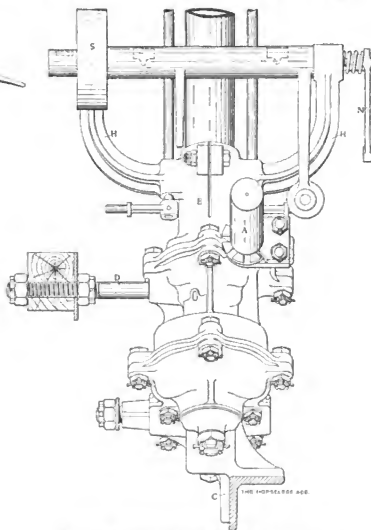


FIG. 2—FRONT ELEVATION OF STEERING COLUMN.

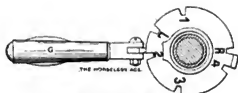


FIG. 3—CHANGE GEAR LEVER.

levers in their place of adjustment is worth noticing. A collar K is passed over the steering post column, provided with lugs, through which the rods pass. The collar K is also provided with sectors on which the levers move, the upper edge of these sectors being provided with numerous small saw tooth notches, into which a sharp edge on the lower side of the levers may engage. To the two steel rods, below the collar K,

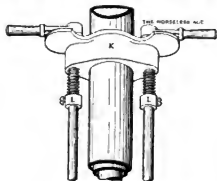


FIG. 4—THROTTLE AND SPARK LEVERS.

are fixed small collars L L secured with set screws, and between these small collars and the lugs on the collar K are interposed coiled springs, which constantly tend to force the rods downward, holding the sharp edge on the small handles in the notches, into which they have been placed. The lever on the right hand side is the throttle lever, and the one on the left hand side the spark lever.

The upper ends of the two brackets H H

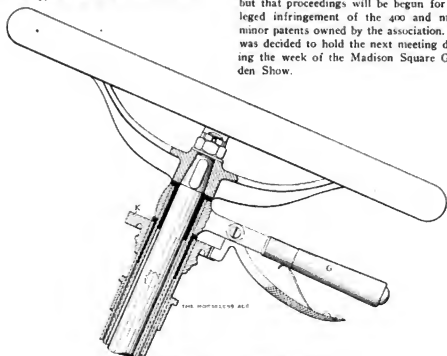


FIG. 5—STEERING WHEEL AND GEAR LEVER.

form bearings for a steel tube upon which the clutch and brake pedals are pivoted. These pedals, as usual, are located on opposite sides of the steering column. The brake pedal on the right hand side of the steering column is normally held in the position where the brake is free by means of a flat spring S. The pedal on the left hand side of the column releases the clutch when depressed.

Through the steel tube supported in the upper ends of the brackets H H passes a shaft of small diameter which at its right hand end has secured to it the small accelerator pedal, and at the left hand end the lever N, which connects to mechanism capable of acting on the engine governor. A coiled spring surrounding the protruding part of the shaft at its left hand end holds it normally in the "off" position.

Buffalo Trade Organizes.

The Buffalo Automobile Trade Association was permanently organized last week. The membership consists of two classes, active and associate. The election of officers resulted as follows: President, E. R. Thomas; vice president, Roy Pelletier; secretary, Dai H. Lewis, and treasurer, John Gibson. The executive committee is composed of the president, vice president, secretary, treasurer and E. C. Bull, J. B. Eccleston and P. W. Eigner. The membership committee, which is a standing one, is composed of John Frey, V. E. Ripper and C. W. Roe.

A. L. A. M. Matters.

At the December meeting of the Association of Licensed Automobile Manufacturers it is understood that it was decided not to bring any more suits at present for alleged infringement of the Selden patent, but that proceedings will be begun for alleged infringement of the 400 and more minor patents owned by the association. It was decided to hold the next meeting during the week of the Madison Square Garden Show.

Club Notes.



World's Fair Tour of A. A. A.

At the last meeting resolutions were passed by the committee to send out circulars of the proposed run to Chicago and St. Louis in 1904. A trunk line has been laid out leading from Boston by way of Worcester, Springfield, Pittsfield, Albany, Utica, Syracuse, Rochester, Buffalo, Erie, Cleveland, Toledo, Elkhart and Chicago to St. Louis. Starting from Boston with a small number, the party will grow larger in each city where feeders lead in from other cities. Following are some of these feeder routes: Providence-Boston, New Haven-Hartford - Springfield, Philadelphia - New York-Albany, Binghamton-Utica.

The journey will be made in 100 mile stages, and will be open to the A. A. A. clubs and private members. Circulars will be sent out concerning hotels and routes, but each one must look out for himself. When a day's journey ends in a small town which cannot accommodate the whole party, they will spread out in a radius of 20 miles or so. The A. A. A. is trying to secure the Delmar track in St. Louis, where rough sheds or tents would be put up to accommodate the owners and machines. An auto carnival is to be held in St. Louis, including races and obstacle races.

A. C. A.

The annual meeting will be held at Madison Square Garden on January 21, and the fifth annual banquet at the Waldorf-Astoria on January 23.

On Tuesday evening, December 15, J. Dunbar Wright lectured at the club on "The Yellowstone Park and Canadian Rockies," the lecture being illustrated with lantern slides.

Berkshire A. C.

The annual meeting of the Berkshire Automobile Club will be held about January 1 for the election of officers, etc. President Brandow reports that the club is in a flourishing condition, with over seventy members.

A. C. OF N. J.

The Automobile Club of New Jersey, of Newark, has elected the following officers: William E. Scudder, president; Frank Eveland, vice president; Joseph H. Gilmore, treasurer; William C. Glass, secretary; governors, 1904 class, S. Hague, W. R. Starrett, G. A. Randel, K. W. R. Koester, A. G. Armstrong and C. W. Lohmeyer; 1905 class, A. H. Lowe, George H. White, Frank G. Dickson, Dr. H. R. Simmons, C. E. Emerick and J. H. W. Lemkau.

A. A. A.

Harlan W. Whipple, of East Orange, N. J., has been nominated for president by

the board of governors, and Messrs. Whipple and Secretary Gillette have been named as a committee to select the other officers.

W. K. Vanderbilt, O. W. Wright and others have been invited to an informal meeting to discuss the new racing rules.

U. OF PA. A. C.

The University of Pennsylvania Automobile Club, of Philadelphia, has been organized by fourteen students as follows: I. S. McMullen, G. B. Fletcher, E. W. Claire, C. H. Angstadt, H. S. Christman, R. T. Neely, M. J. Ingle, F. H. Scott, A. E. Carpenter, L. Davis, J. Allison, E. Lowry, A. L. Shields and H. Walker.

COLUMBUS A. C.

The Columbus Automobile Club has decided to oppose any action of the Columbus, Ohio, council which would tend to reduce the speed limit of automobiles lower than 7 miles per hour, the present limit of street cars on High street, and to recommend an ordinance providing for speed regulation, the numbering of cars and the placing of lights on the same.

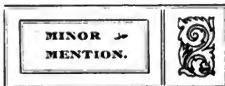
A committee composed of Henry M. Neil, chairman; Oscar Lear and E. W. Seeds, was appointed to wait on the council committee and discuss the proposed ordinance.

MONMOUTH C. A. C.

At the annual meeting of the Monmouth County Automobile Club at Asbury Park, N. J., officers were elected for the ensuing year as follows: President, G. B. Frisbie; vice president, Nelson H. Kilmer, and secretary and treasurer, George N. Pittenger. It was reported that township clerks throughout Monmouth County have heeded to the request that the State law in regard to finger sign boards at cross roads be observed, and that good work along the same lines in other sections of the State is being accomplished, as indicated by replies from automobile clubs, to which the club recently sent letters urging that the matter be taken up in their counties.

PASADENA A. C.

The Pasadena (Cal.) Automobile Club has unanimously decided to enter the Tournament of Roses parade on New Year's Day. Special features are being prepared for the Tournament Park exercises, such as exhibitions of various speeds, from 4 to 20 miles an hour. The contestants who most nearly run their cars at the prescribed rate will be awarded prizes. Exhibitions of the control of automobiles, stopping at signal and avoiding obstacles, to show their ease of management and operation as compared with horse drawn vehicles, will also be given. The club is planning a series of bi-weekly runs of from 60 to 150 miles, taking in the different points of interest in Southern California, and the inauguration of a series of public tours for the benefit of the good roads fund is contemplated. Tracy C. Drake has been elected secretary of the club to succeed R. H. Grayford.



The formation of an automobile club at Janesville, Mo., is talked of.

A movement is on foot to form an automobile club at Oneida, N. Y.

The Malcolm Automobile and Gas Engine Company, Owosso, Mich., is seeking another location.

Warren, Ohio, is endeavoring to secure the Fredonia Manufacturing Company, now located at Youngstown, Ohio.

C. A. Duerr & Co., New York, agents for the Ford cars, have changed their firm name to Duerr, Ward & Co.

The Chicago agency for the Knox machine, it is said, will be taken by Richard Crane in place of A. C. Banker.

The Hyatt Roller Bearing Company, Harrison, N. J., contemplate giving another trade banquet on the night of January 20.

C. B. Stowe and William Wood, of El Paso, Tex., have ordered four automobiles, which will be operated principally for the tourist business.

The E. R. Thomas Motor Company announce that on their new Model 22 they will use 32x4 inch tires instead of 32x3 1/2, as heretofore announced.

It is reported that the Rumsey-Williams works at St. Johnsville, N. Y., have been looked over recently by parties with a view to using them as an automobile factory.

The J. S. Leggett Manufacturing Company, Syracuse, N. Y., have given up business. J. S. Leggett will probably manufacture the same automobile elsewhere.

Frederick Glassup, who will be one of the officials at the Florida midwinter race meet, will entertain during the meeting Sir Thos. Dewar, ex-Sheriff of London, who is an enthusiastic automobilist.

Groat Brothers Automobile Company, Orange, Mass., have leased the building 151 and 153 Columbus, avenue, Boston, which they will immediately refit for the display of their 1904 models.

We learn that the protest against the Stevens-Duryea racer in the Eagle Rock Hill Climbing Contest was not filed by the H. H. Franklin Manufacturing Company, as erroneously stated in our last issue.

The Newark Automobile Company, Newark, N. J., have specially equipped an Autocar, which is to be used by the New York and New Jersey Telephone Company in inspecting their new cable to Philadelphia.

C. S. Henshaw, New England representative of E. R. Thomas Motor Company, has opened a salesroom at 288 Columbus avenue, directly in rear of Back Bay station. He will carry a complete line of parts and accessories, and will open a repair shop on Clarendon street.

The death of Frederick Flandermeyer, a motor cyclist, whose body was found on the

night of October 22 at Jamaica, N. Y., has been accounted for by Albert Obercomski, who states that Flandermeyer was thrown from his machine by colliding with him in the dark.

The Covert Motor Vehicle Company (successors to B. V. Covert & Co., Lockport, N. Y.), which was recently incorporated with a capital of \$100,000, will largely increase facilities for the manufacture of the Covert chainless car, their exclusive model for the coming season.

The Cadillac Automobile Company, Detroit, Mich., has begun work on a brick storage warehouse, 150x350 feet, on Cass avenue, to hold several hundred machines.

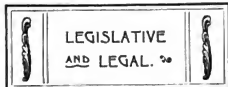
The Haynes-Apperson Company, of Kokomo, Ind., have petitioned the Secretary of State for permission to increase their capital stock \$100,000.

A meeting was held at St. George, Staten Island, New York, on December 8, for the purpose of organizing an automobile club. Charles A. Schultz, of Great Kills, was elected temporary chairman, J. J. Worrell temporary secretary, and Dr. George P. Jessup, Emil Poehn and W. O. Spriggs, together with Messrs. Schultz and Worrell, as a committee to prepare a plan of permanent organization.

Among the new agents for the Winton machines are the following: B. A. Robinson, Worcester, Mass.; H. J. Koller, Newark, N. J.; Quincy Automobile Company, Quincy, Ill.; E. P. Moriarty, Kansas City, Mo.; Utah Automobile Company, Salt Lake City; DeWitt Veeder, Schenectady, N. Y.; W. J. Peters, Dayton, Fla.; Davis Automobile Company, Providence, R. I.; Ben Halliday, Portland, Ore., and George W. Blackmore, Painesville, Ohio.

The Locomobile Company of America report the following recent sales of their gasoline touring cars: F. G. Barnes, New Haven, Conn.; H. C. Holcomb, New Haven, Conn.; G. C. Hubbell, New Haven, Conn.; C. O. Reichert, New Haven, Conn.; E. H. Marlin, the Marlin Arms Company, New Haven, Conn.; De Ver H. Warner, Bridgeport, Conn.; A. W. Lawrence, Bridgeport, Conn.; Mrs. Martha A. Gaines, New York city, and J. F. Havemeyer, president the Havemeyer Oil Company, New York city.

Among the latest concerns to take space at the Herald Square Automobile Show, New York, are the St. Louis Motor Carriage Company, C. R. Radcliffe, the United States Long Distance Automobile Company, Babcock, Atwood & Bowen, Clodio & Widmayer, the Hendre Manufacturing Company, the American Automobile Storage Company, Kenneth A. Skinner, the United Motor Corporation, the Auto Import Company, the Swan Manufacturing Company, the Oldsmobile Company, the Relay Motor Car Company, Chas. H. Meiz, the Rockaway Automobile Company, William H. Terwilliger & Co., the Detroit Motor Car Company, the Rose Machinery Company and the Springer Motor Vehicle Company.



The license and privilege committee of the Springfield (Ill.) city council will report favorably upon the ordinance providing for the licensing of automobiles. The measure is said to be acceptable to all operators.

On December 11 the Appellate Division of the New York Supreme Court reversed the decision in the case of William H. Ellis, who had been fined \$25 last summer for running his machine at an excessive rate of speed. The defendant was merely charged with violating Chapter 625 of the Laws of 1903, instead of with a violation of Section 666 of the Penal Code, and for that reason escapes. The Appellate Court held that the statute under which Ellis was convicted simply says that the municipal authorities may not pass a law requiring a motor vehicle to travel at a slower rate than 8 miles an hour in closely built up parts of the city, or slower than 15 miles where houses are more than 100 feet apart, and points out that the statute does not fix any rate of speed for automobiles, but merely limits the rights of the municipal authorities. Section 666 of the Penal Code makes it an offense to drive at a greater speed than 8 miles an hour on a city's highways, except where the municipal ordinances otherwise provide, but Ellis was not tried under that statute.

The first ruling by the courts under the Bailey law was rendered at Syracuse, N. Y., on December 4, to the effect that when the driver of a vehicle in danger of colliding with an automobile signals to the driver of the latter, he must stop; that is to say, virtually, that the right of way belongs to the vehicle. The decision was made in the case of Mrs. Lawrence B. Meyers, whose horse was frightened by Stephen Dayan's automobile, and who brought suit against Mr. Dayan for \$2,000 for injuries sustained by being thrown from her buggy.

Delegates John W. Williams, of Boyds, and Walter A. Johnston, of Kensington, are preparing bills to be presented at the next session of the Maryland House of Delegates to regulate speed of automobiles.

In the case of Charles M. Houghton, of Amherst, Mass., against the town of Orange to recover for damages caused to his automobile by reason of a defect in the highway a verdict has been found for the defendant town.

An ordinance is being framed by the city solicitor of Cleveland, Ohio, as an amendment to the present ordinance, which will provide for fast as well as reckless driving of automobiles.

DOCTORS' NUMBER, JANUARY 7, 1903.
PRICE, 10 CENTS.

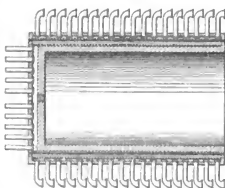
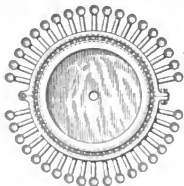


United States Patents.

745,054. Cooling Jacket.—W. R. Hamm, of Simsbury, Conn. November 24, 1903. Filed March 24, 1903.

This invention relates to a cooling device for internal combustion engines, and is especially applicable to automobile engines.

It comprises, briefly stated, a jacket proper combined with a number of radiating tubes, arranged in two groups, one group extending longitudinally of and around the cylinder within the jacket and the other group projecting through and outwardly from the jacket. The jacket is



No. 745,054.

formed in two longitudinal sections, fastened together. The tubes of the inner group are arranged longitudinally of the cylinder in cylindrical form around the same, their ends being open, and the ends of the jacket being open, so that air currents will have a free passage through the tubes. The tubes of the second group pass through the jacket and extend out radially from the cylinder, the ends of these tubes at the sides being bent forward and flared, as indicated, so as to increase the circulation through the tubes.

745,401. Motor Vehicle Steering Apparatus.—Burdick A. Stewart, Pittsfield, Mass. December 1, 1903. Filed December 2, 1902.

745,545. Apparatus for Raising Vehicles for Inspection and Repair.—William R. Webb, London, England. December 1, 1903. Filed August 29, 1903.

GOOD RULES

To Observe in Laying Up Automobiles for Winter.

If the devil finds mischief for idle hands to do, the devil could not find anything worse than rust for idle automobiles, and Science and Practice have never found a better preventative for rust than Dixon's Graphite.

Chains should be removed and dipped in Dixon's Graphite Compound heated to about 180°.

All threaded joints should be treated with Dixon's Graphite Pipe Joint Mixture.

All small working parts should be smeared with Dixon's Graphite Oil.

And pistons and walls of cylinders should have Dixon's No. 635 Graphite thoroughly rubbed into their pores.

If all this is done, so far as rust is concerned, the machine will be as good as new in the Spring, ready to run or sell.

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JEFFERSON CITY, N. J.

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...EVERY WEDNESDAY...

Devoted to
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Interests

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The Paris Exhibition.

The annual Paris Automobile Show, which was opened at the Grand Palais by President Loubet on December 10, shows undiminished growth of the French automobile industry. The number of exhibitors at the successive "salons" may be taken as a fair indication of the magnitude of the industry in France, because every firm in the business to any extent tries to present its products to the public at this great annual mart. The number of exhibitors at the show held in January, 1901, was 400; in December, 1901, there were 560 exhibitors; in December, 1902, 810, and this year the number is close up to 900. Besides, it must be remembered that the volume of business done by the leading firms has, as a rule, been increasing from year to year.

This year a number of the larger exhibitors threatened to withdraw and organize a rival show unless they were each allowed 800 square feet of floor space, and this obliged the management to relegate some of the minor exhibits to somewhat inaccessible galleries and annexed rooms not very desirable for exhibition purposes.

The number of prize competitions in connection with the show is also larger this year than ever before. In the first place, there is again the tombola, for which a chance is given with every admission ticket, and the prizes for which are mostly donated by exhibitors. Then there are competitions for kerosene carburetors, for automatic motor starting devices, for sport publications, etc.

From the reports to hand, it appears that there are no surprising tendencies in construction to be noticed, such as the wholesale copying of Mercedes features last year. These features have held their own or even gained in the more expensive types of cars, but some of them—most of

all, perhaps, the cellular cooler—have been found ill adapted to cars of the low priced class. The mechanically operated inlet valve, however, seems to be steadily gaining ground in all classes of cars. But, instead of placing inlet and exhaust valves on opposite sides of the cylinders, the more general practice is to place both on the same side and operate all valves from a single cam shaft. Some of the Mercedes features which were ignored in the early imitations are to be seen on a considerable number of cars this year, particularly ball bearings for the transmission gear, and, to some extent, the Mercedes type of clutch pedal, which is pushed forward by the foot instead of downward.

In general the progress made during the past year, as reflected by the exhibits, has been in diverging directions. One novel practice, however, has been adopted by a number of firms, namely, to furnish chassis of otherwise the same type in two different lengths, the larger adapted to receive a body with side entrance and the other a body with rear entrance.

Magneto, low tension ignition is being generally adopted in large cars, and in the case of one important manufacturer jump spark ignition by separate coils has been abandoned in favor of ignition by a single coil and distributor.

The present show has more the impress of an international character than any of its predecessors. One reason for this is the constant growth of France's export business in automobiles, which attracts to the show large numbers of agents from neighboring countries, and also quite a few from the United States. Besides, being the earliest important show of the season in Europe, it attracts many constructors who wish to inform themselves at first hand of the latest tendencies in automobile design. Many foreign countries are also represented among the exhibitors, including England,

Belgium, Germany and the United States, the latter, however, only by one or two exhibitors.

Independent Tests of the Edison Storage Battery.

Extensive tests of the Edison alkaline storage battery have recently been made both in England and France, and as the battery is now coming into actual use here these independent European tests are of great interest. The tests referred to were made by Prof. W. Hibbert in England and by the Laboratoire Central d'Electricité and E. Hospitalier in France. None of the tests were of sufficient duration to allow any definite conclusions regarding the life of the battery to be drawn from them, although Hibbert's tests extended over a period of three months, and showed no deterioration, the capacity being as high at the end of that period as at the beginning, and the plates in perfect repair. Some of the tests made by the Laboratoire Central are said to have been so severe that similar tests made on a lead battery would have destroyed it.

The tests were intended to bring out the effect of the rate of discharge upon the tension and capacity, the capacity for holding charge during a period of idleness, the effect of allowing the battery to stand in an uncharged condition, and the watt hour efficiency for various rates of charge and discharge.

The results of the tests are on the whole quite favorable. The chief advantage of the battery brought out by the tests is the possibility of much more rapid charges and discharges than with a lead battery, resulting from the fact that the rate has less influence on the capacity than in a lead battery, and very high rates do not seem to have any material destructive effect on the plates. Calling a three and one-half hour rate the normal discharge rate, it is found (according to Hibbert) that for double the normal discharge current the capacity is still 91 per cent. of that obtained at normal discharge rate; and for 3.2 times the normal discharge current the capacity drops only to 82 per cent. of the normal. These figures indicate that the internal losses increase with the current density much less rapidly than in the lead battery. However, the internal losses are considerably greater, proportionally, at normal discharge rates than in a lead battery. The watt hour efficiency of the Edison battery, according to the Laboratoire Central, varies between 43 and 57 per cent., whereas as high as 80

per cent. is obtained with lead batteries. A direct comparison of the maximum efficiencies obtainable with the two types of batteries would, however, be of little value, as in automobile work the discharge rates are so fluctuating and of such high average value that the best efficiencies are never attained, and at the highest rates of discharge possible with the Edison battery it would be impossible to get any efficiency out of the other batteries.

The loss of charge while the battery was standing idle was found to be only about one-half per cent. per day, and allowing the battery to stand for a fortnight in the discharged condition had no effect on the capacity.

It is stated that for equal capacity the Edison battery is more expensive in first cost than the lead battery, but for equal power it may have the advantage over its rival, owing to the greater possible discharge rates. We would remark, though, that capacity is the proper factor for judging the price, as it constitutes the quantity bought.

The general opinion abroad regarding the Edison battery seems to be that for automobile purposes it will prove slightly superior to lead batteries; it will not be necessary, with an Edison battery, to be always on guard against excessive rates of discharge, and the speed and hill climbing power of electric vehicles will be improved by the practical possibility of rapid discharges.

Designation of Models.

There are now in use among automobile manufacturers two methods of designating their successive models—either by the calendar year during which they are delivered or by serial numbers or letters. A correspondent has raised the question—Which of these methods is preferable?

We do not believe there will ever be uniformity of practice in this respect, as the conditions vary so much with different manufacturers. Some large manufacturers, for instance, market as many as six or eight models simultaneously; hence could not well designate them by the calendar year, while other manufacturers, both large and small, confine themselves to a single model at a time. When cars are designated by the calendar year it is, of course, implied that changes in model are made only once annually, that improvements which may suggest themselves during the year are not applied to the cars until the output for the

ensuing year is started upon; and it is questioned whether this method of proceeding is a wise one. This, it seems to us, would depend to some extent upon the scale on which the cars are turned out, but more upon the importance of the particular improvements to be made, or the need of the improvements. If the car embodies some radical defect only discovered after its regular manufacture has been started upon, steps should at once be taken to remedy it, and to make the necessary change in the model. The better way, however, would seem to be for the manufacturer, before starting upon the manufacture of a car, to convince himself by thorough tests upon the model or experimental machine that all radical defects have been eliminated. This, we are aware, is not always done, changes of more or less importance being found necessary after a car has been in the hands of users for some time, as is evidenced by the expression "in the first few cars of that model," quite frequently met with.

If an experimental machine is given thorough and prolonged tests before parts are ordered for its manufacture it will hardly be possible to make a change in the model oftener than once a year. Besides, reasons of economy in manufacture prevent changes in a model every time an improvement of slight or doubtful value suggests itself.

From the standpoint of the automobile public we believe there is advantage in designating a model by the calendar year, since hearing, for instance, of a 1900 model of any make, one at once knows that it is a somewhat primitive machine, even if he does not know the place its manufacturers occupied in the industry at that time. Designation by number or letter would not convey this information unless one was familiar with the history of the manufacturer.

Against the practice of bringing out a new model once a year it is urged that it has a tendency to cause periodical fluctuations in the demand for cars, creating seasons of activity and slackness respectively. This, we must admit, is very objectionable, particularly from the standpoint of employees of the industry, and if capable of proof would be a strong argument against bringing out new models at definite periods of the calendar year. We believe, however, that a more potent cause of fluctuation in demand is that the use of the automobile is at present largely confined to the open seasons of the year.

Whether it is preferable to designate a

models by the current calendar year or by a serial number or letter cannot, therefore, be generally answered. Each method has in its favor considerations which may make it the most suitable in particular cases. Altogether, and in conclusion, the question seems comparatively insignificant.

The Shenandoah Valley as a Touring Ground.

The article in our last issue describing a trip through the Shenandoah Valley directs attention again to this charming touring region, famous for its rare scenic beauty, its perfect atmosphere and its great historic interest. Another trip through this region was described in our issues of August 20 and 27, 1902. So far few automobilists have ventured there, although it is readily accessible from Philadelphia, and the roads are, as a rule, not so very bad. The toll road is presumably something of a deterrent, and the absence or scarcity of good repair shops requires that the driver have considerable confidence in his car or in himself as its driver. Another reason for the lack of interest in the Shenandoah Valley among automobilists, mentioned by our contributor, is the dearth of suitable hotel accommodations; possibly still another is that during the hot season, when touring is at its height, the natural tendency is to go North, not South, for change and comfort.

There is no doubt, however, that when the persistent automobile tourist has "done" the White Mountains, the Green Mountains, the Adirondacks and the Catskills, he will then turn toward the Shenandoah Valley, and this region will yet enjoy the popularity as an automobile touring ground which it so richly deserves.

Calendar of Automobile Dates and Events.

- January 16 to 23—Madison Square Garden Automobile Show.
- January 21 and 22—Annual Meeting and Banquet of the N. A. A. M.
- January 23 to February 4—Brussels Show.
- January 25 to February 6—Meet of the Florida East Coast Automobile Association.
- February 6 to 13—Chicago Automobile Show.
- February 12 to 24—Crystal Palace Show, London.
- February 15 to 20—Detroit Automobile Show.
- March 6 to 12—Buffalo Automobile and Sportsman Show.
- March 14 to 19—Boston Automobile Show.
- March 19 to 26—Agricultural Hall Show, London.
- March 21 to 26—Washington Automobile Show.

The Paris Exhibition.

By J. S. V. BICKFORD.

INTRODUCTION.

Acting on instructions from the editor, I left home on the evening of December 6 and traveled through the night to London, crossing next day to Paris. On Tuesday morning, December 8, I betook myself to the Salon, and had some misgivings when I arrived outside of the building, for the whole road was congested with motors—motors on their own wheels and motors on the wheels of other cars; motors in tow of other motors and motors in tow of hay motors—all surrounded by a gesticulating crowd, of which each unit was vainly endeavoring to make himself heard above the howling of his fellow mobites. I noticed that everyone going in was producing documents as a sort of passport. Now, I had no documents other than a letter from the Remington Typewriter Company to their Paris house, asking them to lend me a machine (which they very kindly did), and it did not seem to me that that would fill the bill in the present case. However, I reflected that they could hardly give me more than fourteen days' hard labor for not offering to show a passport without being asked, so I composed my face to represent as nearly as possible the expression of the man who had bought the whole exhibition, buildings, cars and people, and, walking as if the destiny of France depended on my promptitude, I marched past the Cerberus at the entrance without looking to the right hand or to the left. The game worked like a charm, and I did it three times the first day. Not once did those benighted gentlemen think to question my perfect right to be about and get in everyone's way exactly as I liked. Brassy cheek will carry a man farther than dollars in this world, if he only has luck.

INSIDE THE HALL ON TUESDAY.

Once inside, the scene was confusion twice confounded and overlaid with dust and packing cases. Stands were being erected on every hand. One firm is arranging to show its cars under a background consisting of a hoary, ruined archway in gray plaster on a wood and canvas backing, surmounted by a clinging cloak of real ivy. The effect is pretty enough, but hardly strikes one as the acme of appropriateness.

There were quite a number of cars already in position, and the main gangway was choked with others waiting to be unloaded. One chap I saw doing what I thought would be wasted work—cleaning an electric brougham with great care. As the atmosphere contained nearly 10 per cent. solid matter, this struck me as likely to need doing over again.

One of the exhibitors with whom I had a chat spoke in glowing terms of the illumination of the hall, and later on in the evening I had the opportunity of verifying his remarks. The building, it will be well to mention, is on the general lines of the

Crystal Palace, London, but considerably broader; at least, that is the impression left on my mind. As in the Crystal Palace, the roof is entirely of glass on steel framework, and the whole of this framework is outlined with orange globed glow lamps. These start in strings from the central dome and gradually thin out as they reach the ends of the building, giving the whole roof the appearance of being outlined in streams of fire radiating from the centre. The authorities are to be complimented on their work in this direction, though I am afraid I can hardly go to quite the length of my friend, the above mentioned exhibitor, who said that it was "only in France where they could do these things decently."

After lending a hand to get a Regina car into position, and nearly getting myself deafened by the mixed French which surged in volumes around that unfortunate cuss (they got there all the same), I came away for the night, leaving the disorder, dust and confusion worse than ever.

AUTOS NUMEROUS IN PARIS.

One very noticeable feature of this city above any other I have yet visited is the enormous number of automobiles in the streets. It is now fourteen years since I was in Paris, just prior to the Universal Exhibition of 1889, and at that time I remember seeing the earliest glimmerings of the present movement on the banks of the Seine. It was, I believe, a steam tricycle, and may possibly have been one of the earlier Serpollet machines. Today the streets swarm with autos. They are all much alike, and in every direction one sees indications of the car settling down to a more or less stereotyped design, with engine in front under a bonnet, clutch next, then change speed gear and either a drive to the live back axle or to a cross shaft driving by chains. This last point is at present the only one on which there seems to be any uncertainty. There are many advantages in the live axle. It saves power and is considerably cheaper, but, on the other hand, it appears from my own experience to be very difficult with a live axle to get the two back wheels parallel. With a fixed axle it is quite easy to give them a shade of divergence at the top to allow for the springing of the axle, but with a live axle this is obviously not possible. The corner seems to be got around in some designs by having a tightening rod (brace) set up with nuts under the differential gear, but I have no personal experience how it works.

On the way back to the hotel I tried to get a reporter's notebook, which I had unfortunately forgotten in London. To my surprise I had great difficulty. Apparently the French reporter does his reporting on his cuffs or his thumb nails. Anyway, no such thing as a reasonable notebook could be had, and I eventually acquired an artist's drawing pad with removable leaves, and a beautifully bound volume in black cloth with nicely ornamented edges and a

dodgey little place for the pencil—quite an ornament to the parlor table, but not fit to hold a candle to the self-respecting reporter's notebook when it comes to drawing sketches of complicated change speed gears.

OPENING OF THE SHOW.

The show opened Thursday morning at 10 o'clock, and if the numbers that went in that first day are any guide in the matter, it must be a great financial success. The entrance charged was 5 francs, and by 4 o'clock in the afternoon you could not squeeze your way about the stands. The whole immense space of the floor and galleries was packed from end to end with one moving, struggling mass of humanity, presumably deluding themselves into the belief that they were looking at automobiles. Even at 11 a. m. it was difficult to get about, and by mid-afternoon it was impossible, except with the stream, and as the streams of people were often trying to move in opposite directions down the same path, progress was not at a speed likely to cause trouble with the police. In the galleries the crush was almost dangerous in parts, and I now have a very practical notion what water feels like in a feed pipe when passing through a check valve.

The general effect of the show was very good indeed, though the very large signs erected by almost every firm obstruct the view. These signs must be very expensive in some cases. Messrs. Clement, for instance, have a large hammered iron archway over their stand, and I have already mentioned the ruined chateau draped in ivy.

Year by year it becomes more obvious that the automobile is settling down to one fixed type, and that revolutionary discoveries are no longer possible. I have already mentioned that the question as to whether the live back axle or the intermediate cross shaft is the better is not yet decided, the advantages seeming very well balanced. Simplicity comes slowly, though most of the best firms are moving in this direction. I was, however, surprised to see that the Mercedes was seemingly about the most complicated machine in the show. The Mors, on the other hand, is very simple for a four cylinder job. I shall return to this car later, some interesting details of which I received from a courteous American gentleman at their stand. The only car in the whole salon which is of entirely different construction to the general run is the Wolsley. This is, as far as I know, the only horizontal engine there [We presume Mr. Bickford had not yet got around to the Oldsmobile stand.—Ed.], and the only car with its peculiar system of chain transmission throughout.

There is a tendency to go back to forked front axles, and the noticeable point about the present design is the enormously massive construction of front axles in general. At a guess I should say that the average

to horse power car fitted with Lemoine gear has a front axle at least $1\frac{1}{2}$ inches in diameter at the smallest point, and the section of the metal at the forked ends would not be less than $2\frac{3}{4}$ inches.

RADIATORS.

There is also a tendency to go back to the old gilled radiator. The Mors Company have done so, and many of the other manufacturers are following suit. The Mors people say the cellular radiators are not satisfactory; for a short time they are very good indeed, but it is nearly impossible to keep the ends of the tubes tight, and before you know where you are the whole radiator is leaky and will then waste more water in an hour by leakage than a gilled radiator would by evaporation in a week. I noticed only one radiator of entirely new design, and this consisted of a small brass tube about one-sixth of an inch outside by one-twelfth of an inch inside, twisted into spirals and interlaced both vertically and horizontally so that the finished article looked like nothing so much as a spring mattress. How the water is supposed to get into this tangle or how the dirt is to be got out I was not told and am not prepared to guess. This question of deposit is also said to be the bane of the honeycomb radiator. As most people knew, warming water to near its boiling point will throw down most of the calcium carbonate ("temporary hardness"). No doubt this will lodge at the heated point to a great extent, but some of it would be certain to be carried round in the circulating system, and it would, one would think, very soon clog the minute passages through the radiator tubes.

There was one car of the commercial order, with a regular tubular (marine type) condenser for a radiator. It looked substantial but would of necessity be very heavy and expensive for its surface. Gills on a tube, as I know from experience, are as efficient as the tube surface itself, if one side of the gill only is considered (that is to say of course they are just 50 per cent. as efficient when their total surface is considered), so that it is very well worth while putting on small gills. Or, to take the matter in another way, the metal used in the gills is quite as efficient so used, other things being equal, as it would be if used in the making of a tube one side of which would have to be in contact with the water and the other only applicable for disposing of heat. On the whole I am inclined to think that we shall come back to the old gilled radiator again. It is also a question whether it is advisable to have the water quite as cold as the honeycomb radiator makes it. Enough of the heat goes away in the cooling water (by recent experiments 40 to 60 per cent), and if any can be saved, at the expense of having to take in water twice a week instead of once a month, it would seem worth while to save it.

In view of the enormous increase in the

cost of gasoline, and the further increase which is sure to come about shortly, it is rather a noticeable fact that there do not appear to be any indications of an attempt to use kerosene. Kerosene in stationary engines will give more power per pound of fuel and more power per cubic inch of cylinder capacity than gasoline, and would for these reasons alone be an ideal fuel for automobile work, if its difficulties could be overcome. These difficulties are, of course, serious. To properly vaporize the charge without any naked flame in the way of a torch (which I know from experience is a nuisance and is always choking up and taking fire, etc.) is a problem which will take a bit of solving, but there is probably something worth while waiting for the man who solves it. One suggestion that has been made and is embodied in a system brought out recently is to keep a body of oil at a uniform high temperature, and use this body of oil as a sort of surface carburetor by drawing the air across its surface. Of course only the more volatile parts of the oil are used, but that does not matter much, as the residue is of very little less value than the original oil. It will be necessary that any arrangement of this sort shall be instantly starting, and to accomplish this it will have to be started up with gasoline, and it is probable that the heat of the exhaust will have to be used, and that only for vaporization.

In the galleries of the show building alcohol apparatus was in great evidence, but I did not see much of the application of alcohol to motor cars, most of the pieces of apparatus shown being of the illuminating order, and some of them looked very promising with Welsbach mantles.

Following is a brief summary of the types to be seen on the stands of the various leading makers and the chief modifications (if any) over the last year's models of these same makers:

The Mors Company show 14, 19 and 24 horse power types. They have returned from the cellular cooler to the flanged tube cooler. The transmission gear is now mounted on ball bearings. Between the friction clutch and the gear shaft is placed a flexible shaft coupling, consisting of square shaft sections, with longitudinally curved faces, and clamping sleeves with similarly shaped openings. This prevents binding in the bearings if the shafts should get out of alignment.

The Mercedes firm shows 18, 28, 40 and 60 horse power models. These show few changes in the mechanical parts. One of the improvements consists in so arranging the differential gear that it can readily be locked if one of the chains should break. The oiling of the machinery is now accomplished by a pressure feed lubricator, the exhaust pressure being used.

The Darracq Company show 12, 15 and 28 horse power machines, the first being a two cylinder one. The last named machine has low tension magneto ignition. The

frames are of pressed steel, of the type called armored frames, embodying the principle of integral aprons for the machinery which was introduced by the Decauville Company last year. The sketch here-with shows this frame. A rectangular opening is cut in the middle of the apron to receive the motor crank case. These frames are made on special presses by what is known as the Darracq-Arbel system, which is claimed to be patented.

Panhard & Levassor show models of 8 horse power (three cylinders) and 15 and 35 horse power (four cylinders). There are only a few changes in this make of car, one being the adoption of the Eisemann igniter in place of storage batteries. Panhard motors over 15 horse power are now fitted with mechanically operated valves. The radiator used consists of small tubes with square gills, which open into a hexagonal header or tank fitting into the front of the bonnet. The pump is placed within the bonnet, where it is better protected from injury.

Renault Frères show models of 7, 10 and 14 horse power, with one, two and four cylinders respectively. In the 10 horse power motor the inlet valves are placed in the cylinder head, and are mechanically operated. An entirely novel change gear is used, which will be fully described in a later instalment. The speed of the motor is controlled by acting on the spring of the admission valve.

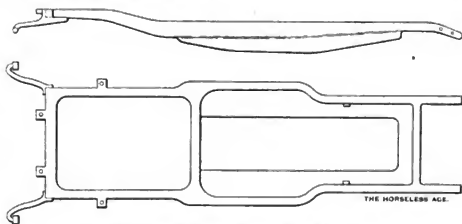
Charron, Girardot & Voigt show 15, 25 and 40 horse power models, the first two having four cylinder motors, and the last named an eight cylinder. This firm has abandoned the steel cylinders, and is now casting the cylinders separately. The valves are all placed on the same side of the cylinders. The change gear gives direct drive on the high speed. In the 25 horse power engine the crank shaft is supported in ball bearings at the ends and a plain bearing in the centre.

The Hotchkiss Company exhibit a four cylinder car in which the engine crank shaft also runs on ball bearings; the frame is said to be made of nickel steel. The cooling system comprises a honeycomb radiator with triangular tubes; the drive is by a Cardan shaft and bevel gears to the rear axle.

The Georges Richard firm has abandoned the tubular frame and now uses a pressed steel frame. Their exhibit comprises models of 8, 16 and 40 horse power. The first a two cylinder machine and the others four cylinder cars. The 8 and 16 horse power cars have shaft drive, while the 40 horse power is fitted with side chain drive.

The Decauville stand contains a 14 horse power light car, which shows few changes over last year's model, the most characteristic feature being the frame, which is formed with an apron for protecting the mechanism. One improvement consists in having the change gear direct driving for high speed.

De Dion-Bouton show the improved 6



THE DARRACQ ARMORED PRESSED STEEL FRAME.

horse power "Populaire" voiturette, a new 16 horse power double cylinder car with sliding gear transmission, and a number of vehicles for commercial purposes, including a sixteen seat public service omnibus and a 1 ton gasoline truck.

Gardner-Serpollet show three new types of their steam car, of 9, 15 and 40 horse power, respectively. In the 9 horse power car particular effort has been made to get all the mechanism under cover and produce an attractive design. A pressed steel frame is used, which is considerably narrower in front than were the frames on the old Serpollet model, and allows of turning in a closer space. On the 9 horse power car the fuel feed pump has been done away with, the fuel being fed under air pressure, and the boiler feed pump is operated from the rear axle and works with a constant stroke. The fuel and the water feeds are still controlled by means of a single lever. This stand also contains a delivery wagon.

A NOVEL STEERING GEAR ARRANGEMENT.

On one of the cars I noticed a novel arrangement of the steering gear. The novel feature consists in casting the body of the steering gear in one with the cover of the change gear box. Besides, the gear itself is different from the usual constructions. It is illustrated by the sketch Fig. 1. It will be noticed that the steering column carries a mitre wheel, engaging with another mitre wheel on the end of the screw, operating the steering swivels. In most of the screw steering gears on the market the nut in which the steering screw works is connected by means of short drag links with the end of a bell crank lever, as in Fig. 2, the other end of this bell crank lever operating the ball

and socket connections to the front wheels. In the present case, however, the nut was rather longer than usual, and had a projecting lug terminating in a ball, which engaged direct with the ball and socket gear. By this means the ball receives from the nut a motion exactly like its own, both as to direction and as to quantity. There are several advantages in this method over the ordinary one. With the usual arrangement, illustrated in diagram in Fig. 2, it will be noticed that the motion of the nut is very slight, in practice usually not more than 1 inch either side of the centre. This means that the motion of the small arm of the bell crank lever is also small, with the result that any play which develops in either the lever, the nut or the end of the steering column is multiplied about four or five times. In the gear under consideration it will be noticed that any slackness in either the nut or its screw (end play) is not multiplied at all.

Altogether, the show must be voted a first class success, and I congratulate the French nation in general and those responsible for the management in particular upon having carried the enterprise through in a very businesslike manner. Not the least interesting part of the business is the illumination outside the building, where the trees, lampposts, statues and balconies are one blaze of orange electric glow lamps. If only it were summer, instead of a very dreary winter, the scene would be like fairyland.

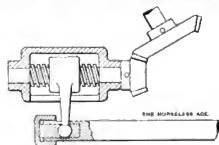


FIG. 1.



FIG. 2.

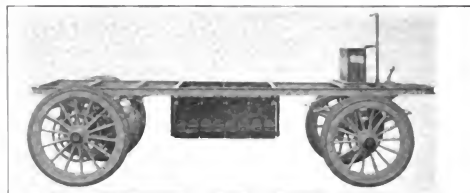
Present Status of the Automobile Truck.

By WILLIAM P. KENNEDY.

The rapid increase in the number of commercial automobiles put into service within the past year gives rise to the hope that we are arriving at a point in the development of this branch of the industry where stability of design and fixed standards will become definitely established. Several manufacturers are now turning out uniform equipments, consisting of complete running gears with motive power and transmission, in units of 1, 3 and 5 tons capacity, each succeeding unit being an enlargement of the preceding one. This system of construction possesses the advantage of having the body or carrying portion of the vehicle specially designed to suit the purpose for which it is intended.

Common to all systems are the running gear frame of steel channel or "I" beam, to which the suspension springs are attached, stationary front and rear axles, and the central hand wheel steering device, with worm gear or spur pinion reduction to the front wheel pivots. Reaches and live rear axles have been practically abandoned. There is a tendency to make the front and rear wheels of the same diameter, or nearly so, owing to the advantage in the possibility of applying bodies of varying width, although some builders claim many advantages for large diameter rear wheels.

For the transmission of power to the rear wheels the pinion and gear and the chain and sprocket are used about equally extensively, the latter being favored in the more recent designs. The adherents of the former claim greater protection against accidental disconnection; compactness in the disposition of the driving shafts with relation to the driven wheels; greater facility for the gradual reduction



VEHICLE EQUIPMENT COMPANY'S STANDARD RUNNING GEAR.

of speed, with less sudden strain in starting, and the comparatively low cost of renewing the worn parts. In favor of the chain transmission the contention is made that experience has dictated a less rigid connection between the countershaft and the wheels, insuring less shock to the motive parts and their suspension from road inequalities; if the axles and wheels are the only vibrating members of the running gear the cost of maintenance is very materially reduced; in electric vehicles the weight of the motors is removed directly from the rear axles, and the necessity for accurate alignment and fixed centres is avoided; the life of the chain transmission suffers less from grit and dust than the pinion and gear transmission, which is difficult if not impossible to effectively enclose; there is less loss in the efficiency of transmission in the chain after considerable wear has taken place.

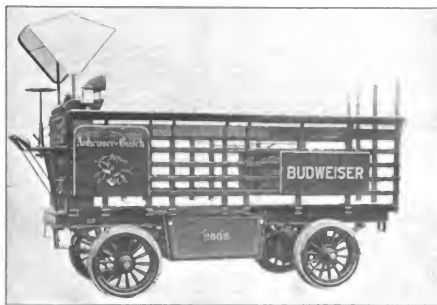
THE TIRE PROBLEM.

With regard to rubber tires, much experimenting has been done on vehicles actually in service, and the tendency has been to gradually increase the width of the tread. Six and 7 inch face tires are almost universally applied to 3 and 5 ton trucks.

These are, however, not yet altogether satisfactory, from the difficulty there seems to be in thoroughly vulcanizing such large thicknesses of rubber. The rubber in a great majority of cases becomes ruptured or disintegrated long before it has given a reasonable amount of service.

Many efforts are being made to develop tires other than solid rubber. Some of these combine rubber with metal and other materials, and many attempts are in progress to produce iron tires of various forms, some of which are giving satisfactory results. With the chain transmission there is a greater possibility of the success of iron tires than otherwise, and that the iron tire will eventually supersede the rubber tire is the firm belief of many progressive designers, but it is agreed also that some radical changes must be adopted in the methods of body suspension on the axles. The abnormal initial cost and the prohibitive cost of maintenance of rubber tires on vehicles of heavy tonnage make progress in this direction imperative to the ultimate success of the commercial automobile.

The number of heavy trucks in service in New York city is a forcible indication of the eagerness of the average merchant to adopt a mechanical means of transportation. It is undeniable, however, that in the present early stage of this branch of the industry there is considerable necessity for improvement. Deterioration is altogether too rapid in the very parts of the equipment which are the most expensive, and were it not for the many advantages to the credit of the machine as a whole discouragement would have resulted even to the foremost advocates of progressive methods in business. A very aggravating feature of the situation is that the sale of these commercial vehicles has sometimes been in the hands of parties whose interests have not been identical with those of the manufacturer, and consequently, whether from ignorance or selfish motives, gross misrepresentation has been made to the purchaser regarding the capacity of the machine, and the probable cost of operation and maintenance, whereas a policy of integrity in these particulars would have



VEHICLE EQUIPMENT COMPANY BEER TRUCK.

proved mutually beneficial to all interests involved.

SOME CAUSES OF FAILURE.

Another phase of the proposition which is very materially responsible for failure of successful operation and for the unjust condemnation of the machine is the haphazard methods adopted by owners for the care and supervision of their vehicles. The usual axiom is that any individual capable of handling a horse is also good enough for an automobile, and to his judgment and intelligence is entrusted the charge of two to five thousand dollars' worth of machinery. The outcome of such a policy is that the caretaker gets his preliminary experience in the practice of mechanics at the expense of the owner, and to the detriment of the reputation of the machine. It is true that most vehicles are stored at well organized and equipped public stations, but it frequently happens that the vehicle has proved such a valuable servant that it cannot be spared sufficiently long from service for attention on the "stitch in time" principle. When at last the overworked and much abused apparatus succumbs under the burden of such treatment, the owner cannot understand why his repairs are so costly, and laments the disadvantages of machinery in general.

Looking at the proposition in a broad spirit, it is only necessary to make comparison with development along kindred lines, to feel confident that persistency will in time bring out the refinements anticipated. Not many years ago, and within the active experience of some now engaged in the automobile industry, the present eminently efficient metropolitan trolley car was but a rickety freak. We have, therefore, good reason to believe that the ingenuity ever present where problems of transportation require solution will not be slow to conquer existing defects and eventually render the automobile truck an indispensable factor to the business community.

To the accomplishment of this purpose it is necessary that a share of the burden



ELECTRIC SIGHTSEEING COACH.

should be carried by the merchant, by affording the opportunity to keep these trucks in service notwithstanding the apparent abnormal cost of maintenance. Thus only can the engineer and manufacturer gain the advantage of that actual practical experience which is positively essential to the elimination of uncertainties and the evolution of reasonable perfection.

Four systems of power for propulsion are at present in successful commercial operation for heavy haulage. These are the steam engine, the storage battery, the internal combustion engine in combination with the storage battery, and the internal combustion engine generating electric current for application to the motors direct without the use of a battery.

ELECTRIC STORAGE BATTERY TRUCKS.

The electric storage battery truck has at present the advantage over its competitors in point of number in use. This is principally due to the simplicity of its equipment and the ease with which it can be operated. Its other advantageous features are direct application of the power and the high efficiency and flexibility of the electric motor, it being the only motor which automat-

ically checks the consumption of energy nearly in proportion to power delivered, and it may be overloaded to 500 per cent. of its normal capacity for short periods without inconvenience or injury. This motor has the further advantage of mechanical perfection, compactness and ability to run equally well in either direction.

The disadvantages of this system are the excessive weight of the battery, the limited mileage for each charge, the time required for charging, and, with the present commercial batteries, the cost of renewals of the same.

Relief from some of these encumbrances is expected in the near future from the fact that the Edison storage battery is now being introduced for trial under the exigencies of actual service. A few dry goods delivery wagons have been in operation with these batteries for several months, and within the past ten days two 2,000 pound wagons in the service of the Adams Express Company have been each equipped with sixty cells of Edison battery. The cells at present in use in this experimental service are not of the dimensions of capacity specifically intended for this class of work, but have been introduced for observation, and preliminary to the production of three new standards of greater capacity, which will be available within the first quarter of the coming year. One of these new standards is designed for heavy truck service.

The Vehicle Equipment Company have been prominently before the public as builders of heavy commercial vehicles of this type, which have been adopted in a great many lines of business. Their system of construction, comprising standard units of running gear and equipment, has enabled them to meet a large variety of demands, from the hauling of coal and roofing materials in bulk to the laborious service required in breweries, where heavy loads and long hauls are common features. Many of these vehicles have unique features in electrically operated devices for handling the material carried. Among these are: Mechanism for raising the body of a coal truck to an angle of forty-five degrees above the



COAL TRUCK WITH MECHANISM FOR UNLOADING IN CELLAR.

supporting platform of the vehicle, to unload the coal into the basement of residences; mechanism for inclining the carrying portion of the body to the street level, to unload sand and gravel; hoisting mechanism for raising safes to the upper stories of office buildings; mechanism for withdrawing telephone cables from underground conduits; winch apparatus for loading and unloading heavy machinery.

As examples of variety in the line of body construction may be mentioned a model railroad coach for the distribution of time tables; a sightseeing coach accommodating forty-two persons in an elevated and exposed position, providing facilities of observation for tourists; a baggage wagon body, made to suit the height of a railroad baggage car, so that the baggage can be handled quickly from a train at a Jersey City depot, the wagon being lowered on an elevator, leaving with the scheduled ferry boat, and transferring the baggage to a New York depot simultaneously with the passengers. This operation was previously accomplished with difficulty by manual labor.

To afford proper care to the machines manufactured by this company, a system of storage stations has been established throughout New York city, in charge of a competent engineer; and provision is also made for the supervision, by an engineer, of the private charging and repair plants where the machines are maintained by their owners.

The Electric Vehicle Company are moving with considerable caution in the manufacture of heavy draft vehicles, and are determined when their product is finally submitted to the public it will embody many improved features, with as little of the element of experiment as possible. Notable among the features of one type of this company's machines is the driving of all four wheels, by having a separate motor for each. This, in combination with a fifth wheel steering mechanism, operated electrically, gives the advantage of ability to turn the vehicle practically within the radius of its own length. The transmission is by chain drive between the countershaft and the wheels, double reduction being employed. The controller is placed concentrically with the steering post, and operated by a hand wheel immediately beneath the steering wheel, which arrangement requires no change in position for the driver when operating the vehicle. Standards of 1, 3 and 5 ton equipments have been established, and all the apparatus, except the controller, is below the level of the body supporting channel steel frame.

The Studebaker Brothers Manufacturing Company, guided by a commendable conservative policy, have been determined to take no risk in putting their vehicles on the market before every effort had been exerted to try out in hard practice all the details of the designs on which their engineers have been at work. With this purpose in view they have had a number of heavy type machines undergoing the rigors of severe practical

tests in New York, Pittsburg, South Bend and elsewhere for over a year, and are now prepared to build automobile wagons and trucks on a broad commercial scale. Descriptive particulars of the design and details of these machines will be given later in this article.

Many other manufacturers who have been engaged in the construction of electric pleasure carriages are at present at work on the design of commercial wagons, but up to the present these have not progressed beyond the experimental stage.

A very interesting innovation in connection with the manufacture of merchandise transportation vehicles has recently been established by Hayden Eames, of Cleveland, Ohio. This consists of furnishing to horse wagon and truck manufacturers throughout the country complete power equipments in 1, 3 and 5 ton units. These equipments comprise standard motors, motor hangers, countershafts, driving gears, sprockets, chains, distance rods, brake parts, steering gears, front pivot axles, controllers, switches, and all the necessary details for complete transmission of power to the wheels.

This move places the problem of vehicle design in the hands of those best qualified by precedent and experience to undertake its solution. After the preliminary inertia inherent to such a project has been overcome we may expect substantial progress in the right direction, and the exclusion of guesswork and experiment. Of course, it is but natural to expect that horse vehicle builders will, with much difficulty, relinquish their traditions where the necessity of mechanical propulsion demands radical departures, and it is a debatable question whether the electric storage battery truck is to survive as the fittest for commercial purposes. But the fact of the experienced wagon manufacturer coming into the automobile truck industry opens up a prospect that this industry will gain very materially in commercial stability, and that their existing relations with the business community will serve in no small degree to smooth the way for the advent of machine methods in merchandise transportation.

Prominent among the manufacturers who have taken up the line of construction just referred to is the Champion Wagon Company, of Owego, N. Y. This company, being specialists in the construction of express wagons, have naturally catered to this particular line in their automobile productions. They have built from 1 to 5 ton machines specially adapted for handling freight and baggage in connection with railroad service, the bodies being so constructed as to facilitate the rapid transfer of goods from baggage and freight cars. An interesting feature in the design adopted is a spring suspension which readily lends itself to the successful use of iron tires.

(To be continued.)

The commercial vehicle contest of the A. C. A. is to be held March 15 and 16.

The New Winton Works.

The Winton Motor Carriage Company have recently added some new buildings to their plant in Cleveland, and now claim to have the largest exclusive automobile factory in the world. The various departments are so arranged that raw materials are received at the centre of the plant and are distributed in the course of manufacture in opposite directions. Directly opposite the point of reception is the machine shop. Building C, with 30,000 square feet of floor space, where the motors are built. In Buildings D, E and L, on 20,000 square feet of floor space, the brass and sheet metal parts of the car, its tanks, radiating coils, etc., are produced. These, with the completed motor, are delivered to Building I, the assembling department, where component parts are fitted together in the chassis frame. This building measures 200 by 125 feet and includes the testing and inspection departments. The body and finishings are manufactured at the other end of the plant.

From the running gear department the vehicle passes into the hands of the outside tester, who gives the car a rough test on the seven-eighths of a mile track encircling the plant and then on the roads. Developing no weakness, the car is delivered to the paint department, which occupies Buildings A and B, with 40,000 square feet of floor space.

The next and final step in the Winton's manufacture is its removal to the trimming department, where the already upholstered tonneau is attached and, the finishing touches are administered.

The woodworking department, where the car bodies are made, is 200 by 168 feet and has a centre span, 200 by 80 feet, unobstructed by supports. The trimming department occupies a building 200 by 50 feet and comprises a complete upholstering department. Separate and distinct from the main plant is the repair department, occupying a building 200 by 125 feet, including machine shop, assembling department and complete assortment of all parts used in the Winton car from its earliest model to the 1904 touring car.

The power and lighting plant, newly installed, includes two batteries of water tube boilers with automatic stokers; and two 200 horse power and one 150 horse power Skinner engines. The 200 horse power engines are equipped with direct current electric generators of the Western Electric Company type, these producing the power for lighting and for operating the individual motors throughout the plant.

Selden Patent Litigation.

In the suit of the Electric Vehicle Company and George B. Selden vs. the Ford Motor Company, C. A. Duerr & Co. and O. J. Gude Company, defendants, whose answer is due early in January, have demanded of the plaintiffs a bond covering the costs of the action. Up to the time of going to press no bond had been filed.

LESSONS OF THE ROAD.



A Day's Outing in a Runabout.

By E. P. HODGES.

Frank A. — is a very "handy" man about machinery, and an accomplished marine engineer, so when he proposed that we take the runabout to Masontown, Pa., for a day's outing—a distance of 40 miles the round trip, over unknown roads—I was not loath, for experience had taught me that a mechanical friend is under some circumstances "a friend indeed." We saw to our oil and gasoline supply, tightened all bolts, jacked up and tested the wheel bearings, and, last but not least, laid in a modest supply of bread, butter, cheese and other cheer for our inner man.

At 8 o'clock on a bright Thursday morning we started our sturdy 5 horse power four cycle, and moved down a precipitous declivity, called a road by courtesy, to the flat bottomed ferryboat, which was pulled across the black waters of the picturesque Cheat River by a taciturn youth in blue overalls. This boat was connected by pulleys to a thick length of telegraph wire extending from bank to bank, and the ferryman walked from end to end of his craft, pulling his heavy load across. Up the steep bank we moved steadily, the engine on low speed giving evidence of a reserve power, which, to judge by common report, we would need later. Soon we came to long undulating stretches of clay road, winding for miles along the right bank of the yellow Monongahela River, for here its turbid waters are augmented by those of the black Cheat in its 200 mile flow from Tucker County wildernesses. We tried direct drive, high speed, and found everything working like clockwork.

Soon we came to the first obstacle—a long, steep grade of yellow clay road heavily stoned with broken limestone, the usual method of "improving" highways in this corner of the State. We threw in the low speed clutch and got about a thousand yards along when we noticed that the water was boiling merrily and steam coming from around the plug (of tank). As the hill was a very steep one the brake refused to hold, and the usual process of stoning the wheels was resorted to.

The plug was well carbonized, so while Frank reclined patiently under a tree puffing at his big cigar I put on my "trouble coat" (overalls) and fell to oiling all places oiled and putting in a clean plug—I always carry three or four in case of emergency. The reverse clutch band was binding, so I lubricated it well and loosened the binding nut a turn. By this time our "steam pressure" had moderated, and we moved on without loss of an explosion. At the top of the hill we sped along over a good undulating road, soon coming to a stone horse trough brimming over with

clear spring water. After filling our own thirst tanks we attended to that of the "machine," which had about one-half a gallon left in the receptacle that held only 2 gallons all told—entirely too small a quantity for hilly country roads. It was unfortunate, too, that this tank was located immediately over the cylinder, and received entirely too much convection of heat from it. I understand that the tank will be put farther away from the cylinder in next year's car.

We were now passing the noble estate or country residence of the Speer family of Pittsburgh, a vast tract of virgin forest and rolling park land, where in early times General Laiayette visited and enjoyed the exquisite pastoral views over the historic Monongahela, which flows in a yellow stream mid green fields, a thousand feet below. The straight, well kept road tempted us to speed along regardless of danger. On we rushed, past wondering, browsing cattle and innocent herds of sheep ruminating in the shade of towering, umbrageous oaks and beeches. Noticing a peculiar noise from under the seat we slowed down and stopped beside a rail fence whereon sat in silent wonder a heavy set man with imposing straw colored whiskers and smoking a corn cob pipe.

Frank, by virtue of his engineering experience, diagnosed our trouble as a "knock" in the engine. We laboriously removed our coats and took off the hand hole cover on the crank case. This hole was evidently made for the fist of an infant, but we managed to locate the knock in the piston pin bearing of the connecting rod. By means of the crowfoot wrench and much patience we tightened the offending "lost motion" and resumed our way, enthusiastic but covered to the elbows with a mixture of lubricating oil and graphite, which by the way I can highly recommend as one of the finest indelible compounds ever discovered. Even the paste that removes grease will not remove the — (hum) spot.

We were now coming to a series of descents, where the road took us into lovely gorges, with steep forest covered slopes on either side. Beside a clear brook, rippling over mossy stones, we sat down and forgot our sorrows in the good cheer which had begun to steal from the wrapping paper and encircle our feet in the car with a pasty mess of food products. Cool draughts served to soothe our brows, and we moved away promptly at 1 o'clock, having but 4 miles to go, according to a rough signboard at the cross roads near the top of the hill.

The road from here to Masontown was a succession of clay heaps interspersed with stretches of broken limestone. This "improving" is the work of a sort of plow or road machine which throws the clay into the centre of the road, which, after being mixed with broken stone, is allowed to stand until the wind and weather, assisted by the passing vehicles, beat it

down to a passable condition, when the "supervisor" passes along in state, mounted on his backboard, removing the loose rocks which dare to remain above ground after this heroic process.

We drove into Masontown, an hour after the last halt, amid the greatest excitement. The grimy coke oven workers stopped shoveling to stare and remark; the boys hung on behind in respectful silence, and when we pulled up in front of the hotel down near the end of the cobbled street we had a motley throng around us. Mr. Grady, who owns the hotel, has been here twenty years from the North of Ireland, but he still keeps his accent intact. Resting one foot speculatively on the front off wheel, he delivered himself as follows: "An' es this the t'ing they call otymobile? Well, yer es takin' yer life en yer han's arid' en et. For why? Well, Luke Smith, the loco-motive engineer, au' me frien', sed tu me t'other day: 'Mike, O've been engineerin' fur twenty years, an' I can't stop fur de life o' me. The charm o' the thing kapes me wid it.' 'Well, says I, 'mark me words, Luke, somethin's goid' to happen.' Be jabers, next day comes the blood curdin' news that Luke had been killed under his locomotive, and six small childer to mourn his loss. Now, mind me, gentilemin, ye may go up hill and down dale for some time to come, but the complications of that divilish machine are sure, sooner or later, to get you into trouble; I wouldn't ride in wan iv thim if the mayor of Masontown had offer me a hunder' thousand dollars in gold." So saying, and mounting his sorrowful hay motorette, Mr. Grady, the grim prophet of Fayette County, ambled away into the neighboring wilds.

Still determined to take our chances, we bought 2 gallons of good gasoline from the town plumber and started homeward. It now being 4 o'clock and darkness of night being due about 7. We sped down the hills rapidly until a bump warned us that one of the 2½ inch double tube tires had mingled its air with that without. We found a gash an inch long in the shoe from a broken beer bottle, and spent forty minutes in patching it with tape and rubber cement. On we sped recklessly, and with the exception of having to renew our water supply had nothing of note to record until we arrived at the ferry on Cheat at 6:30, having made the return run in two hours, including the stops. We had used exactly two lubricators full of oil and 5 gallons of gasoline.

As we came into town the injured tire shoe collapsed with a loud explosion, which made the village policeman reach for his gun and then look sheepish. I forgot to say that the binding of the band clutches gave us quite a good deal of trouble, and would suggest that the lugs on these bands should be made heavier and broader, so as to give more release and play to the bands.

Just a Little Automobility.

By HARRY B. HAINES.

After my return from the New York-Pittsburg Endurance Run I found my sturdy auto awaiting me at the storage station, a bit dusty after its three weeks' enforced idleness. All the tires were flat and apparently done for, and the whole machine presented a rather doleful appearance. The left rear wheel seemed dwarfed in comparison with the rest, the tire on it having exploded before I went away. Incidentally I might mention that I sent it to be vulcanized three weeks ago, and it is still in the process somewhere. One peculiarity about tire manufacturers is that they will not hurry or be hurried. They invariably grow restless if rushed, and suggest that it would be better for the anxious auto user to buy a new tire than to wait for the old one to be fixed, invariably adding that it is always good to have a spare outer cover, and the old one would do very nicely for that purpose.

FOLLOWED THE ADVICE.

I found myself up against this proposition, and after three days' waiting I decided to be "victimized" and buy a new tire rather than wait longer for the old one to come back. I purchased one of the so called punctureless type, and have found it very satisfactory to date, but it has not covered its first hundred miles as yet, so I don't want to boast.

It may be imagined that I was rather anxious to do some riding on my own hook, after my absence, but as a precaution I had the machine thoroughly gone over, and before taking it out had the mechanic's verbal guarantee that everything was all right.

I decided to take a run to Plainfield, N. J., via Newark and Elizabeth, a distance of 30 miles each way. I had arranged to meet some friends in Newark and take them on to Plainfield with me, and allowed two hours' time in which to cover the 16 miles from Paterson to Newark. Perhaps I should have known better than to have made any auto engagement without several hours' leeway, but nevertheless I didn't figure things that way, and therein lies a tale.

TIRE GOES WRONG.

Everything went along nicely for the first 5 miles, and then suddenly the machine began to steer hard and had a tendency to run into the gully at the left side of the road. I rode on for 200 or 300 feet before I found that the left front tire had been punctured and was flat. My first move was to try and locate what had gone through the tire, and feeling around its surface my hand struck a sharp object—a new nail clipper of the variety sold in most drug stores. The clipper was open, and the sharp end had undoubtedly been pointing up when the tire went over it. I pulled it out and found that the arrangement was not bent any, so I pocketed it as an asset to my salvage account.

It was a good half hour's work to jack up the wheel, take out the inner tube, and, after inserting a new one, pump up the tire again. When I went to inflate it I found that some unscrupulous person had appropriated my pump and substituted a leaky one in its place, and I mentally voiced my opinion of the unknown pilferer in no uncertain terms. I had worked myself up to the indignation meeting point by the time I finally had the tire hard enough to go ahead with.

Perspiring freely, despite the fact that the day was cool, I took out the starting handle, and, cranking the engine a couple of times to suck in a charge of gasoline, I put in the switch plug and attempted to start the thing, but, in the words of the classics, "there was nothing doing."

A SPARK PLUG PUZZLE.

After several minutes' unfruitful labor I stopped turning, and began to look for the cause of the trouble. I had filled the gasoline tank to its full capacity before starting out, and I was sure that the difficulty was not there. I took out the spark plug and tested it outside of the cylinder, and it seemed to spark perfectly. Cleaning the points with emery paper, I replaced the plug, but still the motor would not start. It seemed to me then that the trouble must be in the carburetor or the gasoline line, so I disconnected both, only to find them all right. It was rapidly growing dark, and having the best part of the run before me and my friends waiting in Newark, I was in no amiable frame of mind.

I worked along for some time trying to coax the motor to renew its activity, but all to no avail, and finally, as a last resort, I decided to put in a new spark plug and try it. When the wires were connected on the new plug I turned the motor over, and it started immediately and buzzed along merrily. I must confess that I cannot explain why this was, as I have used the old plug since, and, in fact, now have it in the machine, and it is giving good service. I have not touched it in any way. I have experienced this same thing on other occasions. It is needless to say that I did not spend any time trying to figure out the whys and wherefores of ignition troubles, but, lighting my lamps, I climbed into the car and started off, glad to be under way again.

DRAWN A CROWD.

I had no further trouble until Newark was reached, and just as I was crossing the busy corner of Broad and Market streets the motor stopped exploding and the machine halted directly in front of a trolley car. The motorman managed to stop with the fender of the car about half an inch from the rear wheels of my machine. I climbed out and tried to crank the motor, but found that I had no compression. I realized at once that the exhaust valve had stuck, as this thing had happened before. In the two or three minutes that I was stalled a score or more of trolley cars piled into line, and

the motormen and conductors of these came out and very accommodatingly pushed the machine off the tracks and into the gutter while I sat in and steered it, my ears ringing with the shouts of "Get a hoist!" that the crowd which had gathered sent up.

Once out of the way of the rush of traffic, I got out of the machine and pulled up the floor boards preparatory to releasing the valve. A crowd of a hundred or more persons had gathered by this time and were pressing around to see what was the matter. It was impossible to do any work, as they hampered my every movement, and I was finally obliged to call upon a policeman for assistance. The officer very kindly held the curiously inclined at a respectful distance while I poured oil on the heated valve, and was finally able to get it loosened and sufficiently cool to run. I started the motor as soon as possible and was off again, thankful to be away from the gaping mob.

Upon reaching the place where my friends had arranged to meet me, I found that they had gone, leaving a note saying that they had decided that perhaps it wasn't best to take any chances going over in an auto, as they really wanted to get home in time to eat, so had decided to go by train. This seemed to be "rubbing it in" a little, but I realized that my delay in getting to them had no doubt been provoking. I stopped long enough to get something to eat, and then started out again, speeding along at a good rate, as the roads were in good shape and well lit.

Just before reaching Elizabeth the machine began to lose power and speed. It had been knocking quite badly since the start, the noise, as I later found out, being due to the rear end of the motor being loose. The loss of power continued to such an extent that I was finally obliged to stop, and did so, bringing the machine to a standstill under an electric light. When I pulled out the switch plug the motor still continued exploding from heat, and was apparently very hot. It was necessary to put on the brake and reverse at the same time in order to stop it.

A MIX-UP ON THE ROAD.

My first thought was that the lubricating oil had not been feeding into the cylinder properly, and lifting up the floor boards to investigate I was surprised to see a large bunch of waste wound around the cam shaft and smoldering into flame. The discovery was startling to say the least. Putting on my gloves I beat out the flames in less time than it takes to tell it. The blades of the fan were badly bent, and the fan and fan belt were wrapped up in a maze of white waste. A 5 pound can of grease was jammed up against the front axle, partially held in position by a spare fan belt, which was caught on a nail on the body. A black board rather badly sawed by the fan laid, or rather hung,

down on the axle. It was evident at a glance that the bottom board out of the front carrying compartment had dropped out, letting the waste and other supplies down on the fan.

My machine is one of the folding front seat variety, and the manufacturers have placed a rather "cute" carrying compartment under the seat. The baseboard of this had not been nailed in securely and the continual jolting of the grease and oil cans I had stored in there had jarred the nails loose and allowed it to drop down.

The large bunch of waste had dropped on the fan first, stopping its motion, but not before one of the cans had struck it, shearing off one of the blades entirely and bending the others badly. The fan had thrown part of the waste up on the cam shaft, where it had been caught by the bolts holding the spark cam adjustment, and wound around the shaft so tightly that the friction had caused it to blaze up.

I had no pocketknife with me, and found it impossible to pull the waste from the cam shaft, so tightly had it been wound around. It was still smoldering, and I was afraid to leave the car and go to borrow a knife.

For full ten minutes I pulled and tugged at the waste, and then a large brewery truck hove into sight, and I hailed the driver and asked him if he had a knife. Luckily he did, and he very kindly loaned it to me long enough to cut the waste away. The cam shaft and fan cleared, I was able to see what damage had been done.

The fan was badly bent in all its blades, and, as told, one of the blades was missing. I managed to straighten the others so that they would clear the igniter box and large driving wheel, and after tightening the fan belt idler I was ready to start again.

The rattling caused by the rear end of the motor being loose, and one front lamp jarring, had been such that I did not hear the fan blade go, and, strangely enough, the cans of grease and oil did not jar off the axle, having landed against the broad knuckle joint, and being partially held up by the mud splashes. As it was I lost a quantity of tire tape, a can of tire cement and two boxes of hand cleaner, but it was too dark to go back to look for them.

SEVERAL HOURS LATE.

Continuing on my way I reached my destination in Plainfield without any other mishap, several hours late, only to find that my friends had given me up and had retired for the night. I did not want to waken them, and finding quarters for my machine I put up at a hotel until morning.

I was up bright and early and donning a pair of overalls went out into the barn to look things over. My first duty was to tighten the rear end of the motor—a rather dirty job, requiring that I lay on my back under the machine. I completed the task after ten or fifteen minutes' hard work, and then started to look around for other loose

bolts or nuts, despite the fact that the assurance of the mechanic at the repair station that everything was all right was still ringing in my ears.

I found all four body bolts loose, a condition which did not add any to the quiet running of the machine. The steering rods needed taking up on both sides, and the bolts holding the front end of the cam shaft to the angle iron frame were also loose, so badly that it was necessary to put washers under them to take up the play. I finally got things into shape, after an hour's hard work, and after washing up was ready to hunt up my friends. Upon reaching their home I found them all very much surprised to see me, they believing that I had given up the attempt to reach their town. In order to square myself for my failure in keeping my appointment of the day previous I invited them to take a run around the town and out into the country for a short distance. They being agreeable we started.

COMPENSATION FOR DISAPPOINTMENT.

The morning was clear and the air crisp and snappy, and for a hour or more we sped over the roads, enjoying the exhilarating motion and the rushing speed. Everything went nicely, the motor exploding regularly and developing more than its ordinary power, and my friends were beginning to mentally recall all the hard things they had said about autos.

We were coming down a steep hill about half a mile in length, with a rather sharp turn at the bottom, bound for the home of my passengers, the machine coasting freely and running perhaps 20 or 25 miles an hour. I had been holding the car back with the foot brake and was about to press on it still harder to slow up for the turn, when the machine, instead of slackening its speed, seemed to bound ahead faster, gathering added momentum every second.

I pressed on the reverse, at first gently and then harder, but there was no response and I realized that the driving chain must either have broken or jumped the sprocket.

We finally stopped, and my friends, thoroughly frightened, as they might well be, piled out without loss of time, and I was not long in following them. I blocked the wheels of the machine, to be sure that it stood quiet, despite the fact that it was then on level road.

THE CAUSE OF THE TROUBLE.

I then started to look around and found that, as I had surmised, the driving chain had separated and was missing. The emergency brake on my car is a metal clutch operating on the rear axle next the differential gears. If it were to take hold while the engine was running the side springs on which the motor and body are suspended would be doubled up and broken. For this reason it is always kept rather loose, with the bands well oiled. The foot brake acts on the motor, but is, of course, useless should the driving chain break. When I had first applied the emergency brake it was too well oiled to

take hold, and the friction of running had heated it up enough so that it began to work when the foot of the hill was reached, but too late to do any material good.

When my friends had recovered from their fright, and some of the nervous shake had gone out of my own hands, I started back up the hill to find the driving chain. I came across it lying like a coiled snake near the top of the grade and gathered it up. The chain had not broken, as I at first thought, but had separated at one of the links, being of the detachable type. After considerable searching I found all the parts with the exception of two side plates. I had an extra link in the tool box of the machine and managed to fix things up again after some hard work.

My friends were game and agreed to ride back to their home in the machine, and we reached there without further mishap. My trip back to Paterson was also uneventful, and after arriving there I found that the aluminum rod which operates the emergency brake was cracked clean across at the bearing. The manufacturers are now making these rods of phosphor bronze, and I secured one of the new ones. After this experience I will in the future insist on a car with hub brakes entirely independent of the motor.

STARTING MOTOR IN COLD WEATHER.

Now that the cold weather is approaching I find considerable trouble in starting my motor in the morning, or after it has been allowed to stand and get cold. The oil congeals in the cylinder, binding the piston. I find that if the cylinder oil is turned on for a few seconds the fluid will loosen up the old oil and allow the piston to move backward and forward much more freely.

During these windy days I find that by pulling up the back of the folding front seat I have a high dashboard that keeps the wind off me and makes the wagon most comfortable to ride in. I anticipate using my machine all winter, and as it is of the air cooled type should, I suppose, have little, if any, trouble.

American Candidates for the Gordon Bennett Race.

Three machines have been entered with the A. C. A. for next year's Gordon Bennett race—one by the Peerless Motor Car Company, of Cleveland; one by Alden Sampson, of Pittsfield, Mass., and one by Peter Cooper Hewitt, of New York city. The time for entry has now expired. However, it is not certain that all the three machines will participate in the actual race, as the racing committee of the A. C. A. will demand proof that the machines entered are fast enough and generally fit to worthily represent the club in the event. Mr. Sampson's machine will be built by a firm in Pittsfield, Mass., which has had quite a little experience in building automobiles. Mr. Hewitt's machine is said to be nearly complete; it is being built by the Trenton Iron Company, of Trenton, N. J.

NEW VEHICLES AND PARTS.

The 1904 Locomobile Touring Car.*

By ALBERT L. CLOUGH.

The Locomobile Company of America are producing at their factory at Bridgeport, Conn., the 1904 model of their 16 horse power touring car, which, while not differing essentially from their 1903 production, yet deserves careful description. This car shows the intention of its producers to adhere closely to those principles of foreign practice which have been demonstrated to be sound, with the additions of such changes and refinements as American ingenuity can suggest.

FRAME CONSTRUCTION.

The vehicle frame is of rectangular construction, formed of two steel angles which are bent to form the corners and joined at the middle of the ends by being electrically welded. This forms a rivetless frame. The steel is of channel section in the middle portion of the sides where the bending is greatest. Other steel angles, riveted to the main frame, form the supports of the engine and change speed box. Semi-elliptic springs are used throughout and are very long, to secure easy riding qualities, being 36 inches in front and 44 inches in the rear. Both ends of the rear springs and the rear ends of the front springs are shackled.

Drop axles are used in both front and rear, the axles being forged in halves and joined by very long welds at the centre. In the front, the crutches which carry the steering pivots are a part of the forging. The steering pivots and steering cranks are drop forgings. Plain bearings are used for both front and rear wheels, the axle ends being hardened and ground, and the wheels being bronze bushed. The hub caps are hollow and oil tight and contain a quantity of lubricant which is intended to work along oilways in the axle ends and oil the



FIG. 1—SPARK PLUG PARTS—COMPLETE PLUG.

whole bearing. Artillery type wheels of 34 inch diameter, shod with 4 inch clincher tires are employed. The rear wheels carry the sprockets bolted through the spokes. Band brakes of the strap type, operated by a lever which also releases the clutch, act upon drums upon each of the rear wheels, and a sprag is also provided. The inclined steering column is affixed to the angle iron frame and the body may be removed from the chassis by simply uncoupling the gasoline pipe. A worm and sector steering gear is used, which is fully enclosed and adjustable to correct any lost motion, which must be very slight, as the gears are hardened. Adjustable ball joints are used in the steering linkage, which consists of steel tubes. The wheel base of the car is 86 inches.

THE MOTOR.

The motive power consists of a four cylinder vertical engine with cylinders of 4 inch bore and 5 inch stroke, placed in front under a bonnet. The cylinders are cast in pairs, and the heads, water jackets and valve chambers are cast with the cylinders themselves, thus avoiding packed joints. The valve chambers are on the left hand side, with the automatic inlet valves above and the exhaust valves below. A housing covers each pair of inlet valves and this is secured by a single nut, so that it is very easily removed. When this is done, the inlet valves may be lifted out, and, by means of a special tool, the exhaust valves may be forced up, the spring freed and the valves removed upwardly through the same orifice. It is so arranged that the mixture pipe is

not disturbed when the valves are removed. Solid forgings are used for all valves, the inlet valve being $1\frac{1}{2}$ inches in diameter, with a maximum lift of one-eighth of an inch and the exhaust valve $1\frac{3}{8}$ inches in diameter with a lift of five-sixteenths of an inch. Forty-five degree seats are used. The spark plugs enter the valve chambers horizontally between the two valves, and are perfectly accessible from the left side of the vehicle. The cylinders are bolted to the upper portion of the crank case, which is a manganese bronze casting and contains the bearings. Its lower portion is formed by an aluminum casting which acts simply as a cover and is not depended upon for strength. The upper portion carries the lugs which fasten the engine to the steel angle frame, and the lower portion may be removed without disturbing any parts of the mechanism, and when this is done all reciprocating parts may be readily examined. A partition divides the crank case into halves (one for each two cylinders), and a standpipe in each half prevents the carrying of an excessive amount of oil. The pistons are ground to a perfect fit and are supplied with four diagonally cut packing rings, which are also carefully ground. The wrist pins are hollow and there is a ring cut in the cylinder wall which is constantly kept full of oil by splash from the base. When the wrist pins come opposite this ring, oil enters them and passes to the connecting rod bearings. Any excess of oil retained in the ring is returned to the crank case through a channel in the cylinder wall. The connecting rods are of steel, of I-beam

*An illustration of the car complete appeared in THE HORSELESS AGE of September 16 last.

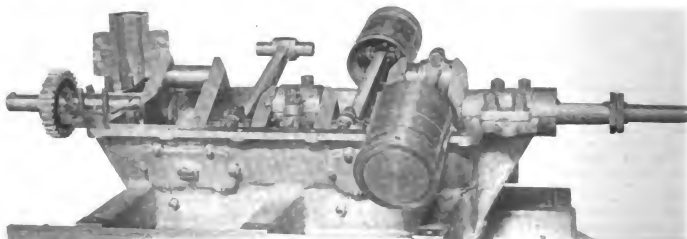


FIG. 2—ENGINE BASE, SHOWING BEARING CAP REMOVED AT LEFT, REVEALING COPPER SHIMS BY MEANS OF WHICH BEARING IS MADE ADJUSTABLE FOR WEAR

tion, and have a steel bushing inserted for the wrist pin bearing, and a bronze bushing for the crank pin. It is the practice of the Locomobile Company to use hardened steel moving parts in bronze bushed bearings wherever possible, and diagonal oilways are cut in the bushings and oil pockets employed. Bearings are carefully fitted by scraping, when being assembled. The four throw crank shaft is made of a steel forging and is $1\frac{1}{2}$ inches in diameter. It is supported in a liberal bronze bushed central bearing, as well as in the ends of the crank case. These bearings, as well as the crank pins, depend for their lubrication upon the splash and have oil pockets and oilways. An aluminum case at the front of the engine encloses the secondary gears, and the half speed shaft passes through the engine base on the left hand side. It is supported in five babbitted bearings, and oiled from the splash. This shaft and four exhaust cams which it carries are machined from one piece of steel, and the exhaust valve push rods, which are forked at their lower ends to prevent their turning, carry hardened steel rollers. There is an adjustment of the exhaust valve lift by means of nuts with lock nuts.

The centrifugal pump and ignition dynamo are driven from the secondary shaft by enclosed gears, and the dynamo and pump shaft also carries the fan pulley. The centrifugal governor is mounted on the secondary shaft and acts to throttle the mixture. Below the secondary shaft is carried the contact device, driven by a gear. This is of the wiping contact or commutator type, and consists of a circular hard rubber case through which the four primary wires are brought to steel segments set at 90 degrees intervals. A steel spring pressed wiper on the shaft moves successively over these segments and closes the circuit for the four cylinders in rotation. A hard rubber case covers the mechanism. All the accessory mechanisms, driven by the secondary shaft, are positively connected to it and they and their gears are encased, with full lubrication.

IGNITION SYSTEM.

A very interesting ignition system is employed on this car. The plug is of particularly large size, with an extra heavy porcelain insulating bushing and piled up mica washers for insulation where the heat is intense. A large gas cavity is formed in the plug end, under the points, which renders the plug self cleaning. The four coils are carried in a box on the dash, and have special vibrators arranged to secure a full contact period, but an instantaneous break. Two separate Exide storage batteries of two cells each are carried in a box on the side of the vehicle, and either one of these can be coupled in parallel with the dynamo and primary circuits at will, by a switch controlled from the steering head. An automatic electric switch on the dash also controls the connection of the dynamo to the battery, and so long as the generator volt-

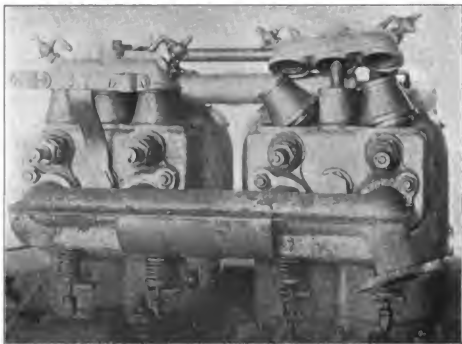


FIG. 3—TOP OF MOTOR, SHOWING METHOD OF REMOVING VALVES

age is less than the battery voltage this switch is open. As soon, however, as the generator voltage exceeds that of the battery the switch closes and the battery begins to charge. By occasionally changing from one battery to the other both batteries may be

kept fully charged, but the automatic switch prevents overcharging, even during long periods of high speed running.

All primary wiring is with heavy rubber covered cable, and the secondary leads are of special flexible conductor, surrounded

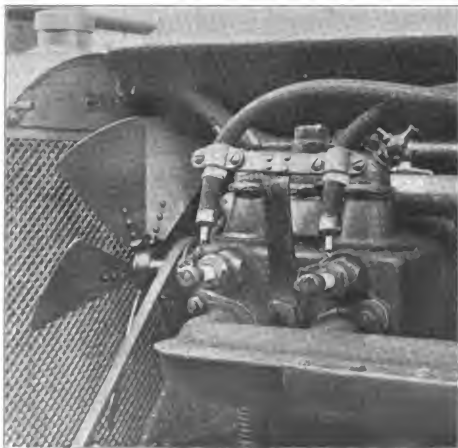


FIG. 4—RADIATOR AND FAN. ALSO FLEXIBLE CABLES AND CHAIN CONNECTION TO SPARK PLUGS.



FIG. 5—OPERATING LEVER. SPARK LEVER AND THROTTLE JUST UNDERNEATH STEERING WHEEL, THE NEAREST BEING THE THROTTLE. THE FOOT ACCELERATOR IS THE UPPER ONE OF THE TWO RIGHT PEDALS.

by a layer of pure rubber, a thick layer of rubber compound and a braided covering. The insulation is so thick as to make the outside diameter of the conductor three-quarters of an inch. For connecting the secondary leads to the spark plugs a short length of chain is employed. This avoids all mechanical strain on the plugs and also interposes several minute spark gaps, due to the loose contact of the chain links.

COOLING SYSTEM.

Engine cooling is effected by means of a cellular radiator of the Mercedes type, with a fan directly behind it, carried upon bearings secured to one of the engine cylinders and driven by a flat belt. The circulating pump is of the centrifugal type. On the

The carburetor is located on the left of the engine and is of the constant level spraying type. Before entering the float chamber the gasoline passes into a small settling compartment provided with a drain cock, thus preventing impurities from being carried into the carburetor proper.

The spraying nozzle is separate and when screwed out allows the passages to be thoroughly flushed. A seamless copper float regulates the gasoline level. Special provision is made whereby the carburetor may be supplied with any proportion of warmed and cool air as desired, by means of an adjustable regulator. The warm air is collected from a shield surrounding the exhaust manifold. A uniform mixture is secured at all speeds and throttle openings, by

means of an auxiliary air inlet operated in conjunction with the throttle.

Engine control is by means of the spark advance lever on the steering column and by the automatic throttling governor. There is a pedal accelerator and also an accelerator on the steering column, operated by hand, so that speed may be controlled manually or by the foot as desired. The accelerator acts to vary the leverage of the governor arms in their closing of the throttle. When a high engine speed is desired the fulcrum of the linkage is moved by the accelerator into such a position that a large movement of the governor rod acts to close the throttle very little, and vice versa.

LUBRICATION.

The arrangement of the electric switch is such as to start the oil supply when it is thrown out and to shut off the supply when the switch is opened.

There are three sight feeds from the gravity magazine oiler, which is located just back of the engine under the bonnet, where its contents will be maintained at a nearly uniform temperature. These feeds supply the two crank cases and the secondary gear case. The supply carried will suffice for about 250 miles.

The muffler is in the rear, and is of the customary compartment type, provided with cut out. Seventeen gallons of gasoline are carried in a tank under the seat.

TRANSMISSION SYSTEM.

A clutch of the conical leather lined type is used, but the clutch disk, flywheel and engaging springs form one structure, and thus the frictional parts are drawn together without the production of shaft thrust. The clutch operating mechanism is enclosed in the gear case and constantly lubricated. A pedal clutch release is employed, and the application of either brake throws it out.

The case which contains the clutch engaging mechanism, speed changing gear and differential, consists of a special bronze casting secured to the angle iron frame. This frame is covered above and below by easily removed aluminum casings, which render the construction oil tight. All bearings and operating levers are secured in the bronze portion so that the covers may be removed without disturbing the mechanism in any way.

Both the change speed shafts and that carrying the differential are hardened and ground, and run in removable bronze bushings carried by the case. Each bearing has oil pockets and oilways to distribute the lubricant. For the gears a special grade of metal, combining extreme hardness with toughness, is made use of. They are carefully cut and are of sufficiently large pitch and beveled in such a manner as to engage readily. The square shaft carries the two sliding gears, which engage with corresponding gears on the second shaft. The reverse is obtained through an idler. The low gear is one-quarter that of the high and the intermediate is one-half the speed of the high. A bevel gear on the square shaft,



FIG. 6—RUNNING BRAKE DRUM—DIFFERENTIAL GEAR PARTS.

constantly in mesh with another on the differential shaft transmits the power to the differential at a speed determined by the particular sliding gears which are in mesh. To secure the direct drive, the leading sliding gear, which carries an internally cut gear, is slid still farther along until this internal gear engages with an external gear, so that when these two engage all other gears are rotating idly and the square shaft is locked to the engine shaft.

All gear changes are effected by a side lever, which moves over a notched quadrant, and an interlock is provided which prevents the gears from being changed while the clutch is engaged.

In the rear of the gear case is carried the four pinion bevel differential, entirely enclosed and lubricated by the splash. The bevel gear of the longitudinal shaft from the change speed gear engages with the corresponding bevel gear on the differential casing. A drop forged steel casing forms the differential frame, and the bearings of the shafts are especially liberal. Universal clutch couplings are employed in the countershaft to take care of any misalignment which might arise from severe road conditions. The outboard bearings of the countershaft are in brackets formed of steel castings and supported by the vehicle frame. These bearings are bronze bushed and lubricated by compression grease cups. The transmission to the rear wheels is by the usual sprocket and chain gear.

There is a brake drum on the transmission shaft, which is encircled by bronze wood lined shoes operated by a powerful toggle joint from a pedal.

Careful attention has been paid to the security of all parts by double nutting all bolts, and by the use of castle nuts and cotter pins.

The body is of very attractive design, with divided front seats, and the tonneau is removable, leaving a trunk platform in the rear.

The car weighs about 2,200 pounds.

The "Model" Runabout With Detachable Tonneau.

The new runabout of the Model Gas Engine Company, of Auburn, Ind., is equipped with a 12 horse power double opposed cylinder motor, and has a novel type of transmission gear, which gives three forward and two reverse speeds. The car is provided with hub brakes and wheel steering.

The main frame is forged from one piece of angle steel, and is supported on semi-elliptic springs. The wheels are artillery type, and equipped with double tube detachable tires, either 28x2½ inches or 30x3 inches. The front axle bearings are Timken roller bearings and the rear axle bearings Hyatt roller bearings. The car has a wheel base of 72 inches and a tread of 56 inches.

The motor cylinders are of 4¼ inches bore by 5 inches stroke, and the motor is



FIG. 1—"MODEL" RUNABOUT "IN THE WHITE."

said to develop 12 horse power at 1,000 revolutions per minute. The cylinders are cast integral with the cylinder heads and valve chambers; in fact, the whole engine is cast in one piece, except the crank case cover and the crank shaft bearings, which are bolted to the crank case, as shown in the illustration of the engine. The valve chambers are completely surrounded by water jackets. The coverings over the valve chamber openings are cup shaped plates with a ground spherical seat. Absolutely no packing is used in the engine. The carburetor and inlet pipes are of 1½ inches diameter, while the inlet and exhaust valves are of 1¾ inches diameter. Valves of such large diameter are used in order to make a high lift unnecessary, thus reducing the noise and securing more rapid opening and closing of the valve. Both the exhaust and inlet valves are mechanically operated, and only a single cam is used for the exhaust valves and the inlet valves respectively. All bearings are brass, and are provided with adjusting means.

The crank case cover is of aluminum, and makes the crank case oil tight. A large size lubricator is located on top of the crank case cover, and is designed for force speed, with an automatic check. It is claimed that every part of the engine, including the cam shaft, valves, crank

shaft, piston and connecting rods, can be removed without disturbing the cylinders. The pistons can be removed without disturbing the crank shaft.

Jump spark ignition is used, and the commutator is mounted on the end of the



FIG. 2—TOP VIEW OF ENGINE AND CHANGE GEAR.

cam shaft. It is plainly seen in the side view of the engine herewith. The device is entirely enclosed, the casing being provided with a screw cap with mica window through which the operation can be observed. A battery of dry cells furnishes

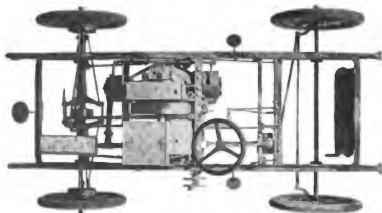


FIG. 3—PLAN VIEW OF RUNNING GEAR FRAME.

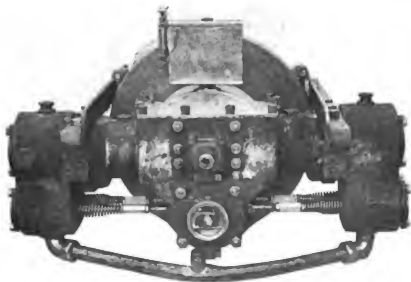


FIG. 4—SIDE VIEW OF MOTOR.

the ignition current, and a special non-vibrating Dow coil is used. The speed of the motor is controlled by changing the time of ignition and by throttling the charge.

The cooling system comprises a water tank and a radiator with a centrifugal pump mounted directly below the tank. The pump is driven by friction from the flywheel of the engine, the friction wheel being pressed against the flywheel face by a spring. The water tank has a capacity of $2\frac{1}{2}$ gallons, and the gasoline tank holds 6 gallons. The weight of the engine complete is 275 pounds.

The change gear combines the principles of friction wheels and sliding gears. Referring to the line cut of the transmission herewith, B is an extension of the motor shaft to which is secured the flywheel A. Loosely mounted upon the shaft B is the friction clutch drum W, to which is secured the sprocket pinion Y. M represents the clutch carrier and O the conical sliding collar for operating the friction clutch. It will be apparent that when this friction clutch is thrown in, the drum W with the sprocket pinion Y is

fixed to the motor shaft, and the drive to the rear axle is direct, which gives the high speed.

The flywheel is in the form of a drum, and is provided with two cylindrical friction surfaces, one on the inside of the rim and one on the hub, which latter is of more than the usual diameter. The pulley E on the shaft C is capable of being engaged with either of these friction surfaces. The shaft C near its outer end carries a spur pinion G in mesh with a spur wheel H on an intermediate shaft D. Upon the shaft D is also mounted a pair of sliding pinions I J. By sliding these pinions along the shaft D the pinion I may be brought into mesh with the gear wheel K formed integral with the clutch drum W, and the pinion J may be brought into mesh with the gear wheel L secured to the clutch drum W. Throwing the pulley E in frictional engagement with the outer or larger friction surface, and bringing the pinion J into mesh with the gear wheel L, gives the intermediate forward speed, which is equal to about one-half high speed. Leaving the pulley E where it is, and shifting the pair of sliding

pinions so as to bring pinion I in mesh with the gear K, gives the slow forward speed, which is equal to one-sixth of the high speed. The two reverse speeds are obtained by bringing the pulley E into frictional engagement with the inner friction surface, and meshing one or the other set of sliding gears. The slow backward speed is only one-twentieth the high forward speed. It will be observed that when the sliding pinions I J are in the neutral position, they straddle the gears L K, and when the car is driven on the high speed these gears are stationary.

The total number of gears in the transmission is six, and of these two are only 2 inches in diameter. In every case a steel pinion meshes with a bronze gear. The entire transmission gear, including the friction clutch, is enclosed in an oil tight aluminum casing. The total weight of the transmission without casing is about 60 pounds. The friction clutch consists of a cast iron shoe engaging a brass surface, and as the clutch runs in oil there is said to be no danger of the clutch gripping fiercely. The rear wheels are provided with hub brakes, and in addition the reverse gear can be used for braking purposes. The car is equipped with the Warner No. 1 differential gear and a worm wheel sector type of steering gear. The gasoline and water tanks are located under the seat, which leaves the hood in front free for luggage.

The car is intended for four passengers, and weighs, with tonneau, 1,200 pounds. The tonneau is said to be roomier than the tonneaus ordinarily found on this size of car, being 36 inches from the back of the front seat to the back of the tonneau seat. A maximum speed of 35 miles per hour is claimed. The car is painted a maroon color and upholstered in full leather; it is equipped with large fenders, lamps, horn and tool equipment.

Corbin Delivery Wagon

The Corbin Motor Car Corporation, of New Britain, Conn., has built for the Russell & Erwin Company, manufacturers of hardware in that city, a delivery wagon which has now been in continuous and successful use for about a year, in transporting goods to and from the freight depot, carrying stock about the company's yards and performing a general trucking and parcel service. One of the regular horse drivers in the company's employ has been trained to operate it, and it is ordinarily in use ten hours per day, accomplishing, according to the statement of the users, the work of three ordinary horse drawn teams.

The vehicle has a body of the ordinary express wagon form, with a carrying space 7 feet long by 4 feet wide. Its wheel base is 96 inches and the gauge is 60 inches. The artillery wheels are 36 inches in diameter and the tires are $3\frac{1}{2}$ inch solid rubber. Full elliptic springs are used in front and rear and the steering is by side lever. A

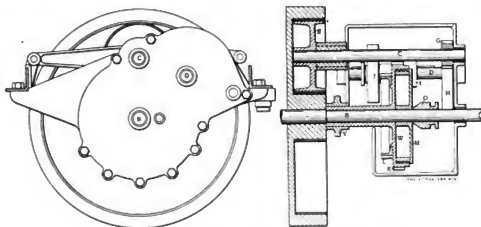


FIG. 5—END ELEVATION AND SECTION OF CHANGE GEAR.

solid rear axle is employed and all wheel bearings are plain. The weight of the vehicle is 3,300 pounds and its rated load 1,500 pounds, although it is stated to have repeatedly carried a load of 2,500 pounds for considerable distances. About 3 miles per hour is the speed on the low gear and 10 miles the maximum on the high, the two speeds and a reverse being furnished from a gear of the planetary type.

The motive power is supplied by a single cylinder horizontal air cooled engine carried in the forward part of the vehicle under the footboard. The cylinder is provided with radiating surfaces formed according to the unique system of the Corbin Company, and a propeller fan delivers a blast of air directly on the combustion chamber. In order to obtain access to the motor the body is so arranged that the entire front portion may be raised, exposing the mechanism to view. The two forward speeds and reverse are handled by a single lever on the steering column, and the speed of the engine is regulated entirely by spark position by means of a lever near the driver's hand. The change speed gear is on the engine shaft and from it a chain transmits to the countershaft, on which is mounted the spur differential. The drive from the countershaft is of the ordinary type with two chains. The motor is rated at 8 horse power.

Synnestvedt Electric Vehicles.

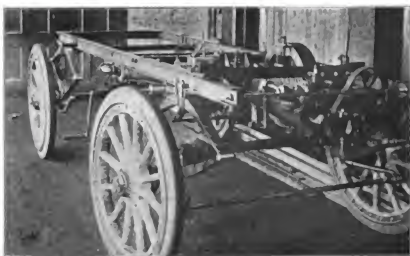
The Synnestvedt Vehicle Company, of Pittsburg, Pa., have recently brought out a line of electric vehicles, including an opera bus, a passenger bus, a delivery wagon and a tonneau. The passenger bus illustrated herewith gives an idea of the general construction of these vehicles.

A single motor is employed, which is of the railway type, with an ironclad field in two parts, giving ready access to the armature. The armature shaft is hollow and has connected to it the differential gear placed between the motor and one of the outer driving shaft bearings. The differential shaft passing through the motor shaft is a one piece shaft, one of the side gears of the differential being connected to a sleeve upon this shaft. The motor has a pivot support on the rear axle and its front end is supported between double springs on a cross frame bar.

Separate chain drive direct to the rear axles is employed. A peculiar feature of the construction is that the driving shaft rests in bearings outside the driving sprockets, in addition to the bearings in the armature sleeve. The chains are of the Morse "rocker joint," frictionless power drive chain type, and are claimed to be self adjusting for wear.

The entire storage battery always remains in series and the speed is entirely controlled by commutating the motor connections.

The opera bus has seating capacity for ten people. It weighs 3,500 pounds and is claimed to have a radius of 50 miles on one charge. The controller gives three speeds



CHASSIS OF CORBIN DELIVERY WAGON.

ahead—5, 9 and 13 miles per hour—and two reverse speeds. The battery is distributed under the front hood and rear seats. The passenger bus seats twelve people and has the same weight and speed ranges as the

to be 50. The mileage of the tonneau is claimed to be 60; it has three speeds forward—5, 9 and 18 miles per hour—and two reverse. The weight is 2,400 pounds and the seating capacity five persons, two in



SYNNESTVEDT DELIVERY WAGON.

opera bus. The delivery wagon also has the same speeds as the above vehicles and is designed for a maximum carrying capacity of 1 ton. Its weight is 3,300 pounds, and the mileage on one charge is claimed

front and three in the rear. The car is equipped with a top and a glass front, and the front can be raised in summer and fastened to the top of the machine. The tonneau has a rear door with drop seat, but it



THE CORBIN MOTOR DELIVERY WAGON.



SYNNESTVUT PASSENGER BUS.

can also be entered from the front, as the front seats are separated.

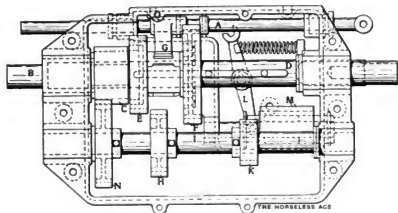
One of the passenger buses was in service in Chicago from June, 1903, up till cold weather set in, as a public conveyance, and covered nearly 3,000 miles.

A New Transmission Gear.

Brew & Hatcher, of 34 Columbus street, Cleveland, Ohio, have brought out a new sliding gear transmission giving three forward speeds and one reverse. The drive on the high gear is direct and the gear is operated by a single lever giving motion to the operating rod A. B is the clutch shaft passing through a bearing in the wall of the casing and carrying inside the casing the pinion C. The shaft D, which is coaxial with the shaft B, has a bearing within the latter and carries a pair of sliding gears E and F, sliding on a feather key on the shaft. The gear E is also cut with internal teeth just fitting

over the pinion C. When the sliding gears are shifted to their extreme position to the left, the gear E surrounds the end of the pinion C, its internal gear teeth engaging with the teeth of the pinion, thus locking the shafts B and D together, causing the power to be transmitted directly. When the sliding gears are shifted to the right, by means of the shifter lever G, gear E is brought into mesh with gear H on the countershaft I. This gives the intermediate speed. If the shifting motion is continued, after gear E has passed out of mesh with gear H, gear F passes into mesh with gear K, giving the low forward speed. Upon further motion of the sliding gears a projection extending from the operating rod A engages the lever L and shifts the intermediate or reversing pinion M into mesh with both gears F and K, giving reverse motion. The reverse gear is idle except when in use.

This gear weighs, with cast iron case, 60 pounds, and with aluminum case, 45



BREW & HATCHER TRANSMISSION GEAR

pounds. The gears are made of soft steel and case hardened. At an engine speed of 1,000 revolutions per minute this gear will give 28, 16 and 8 miles per hour.

The New Morgan & Wright Clincher Tire.

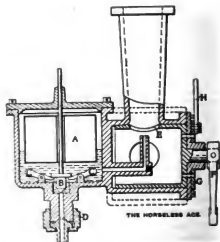
The manufacturers furnish us the following description of this tire:

It has a specially treated elastic fabric, which obviates to a large extent the cracking or blistering due to hinging, materially increases the tire's resiliency, and greatly lessens the possibility of separation between the fabric and cover. The clincher is made of the best quality of duck so interwoven with the fabric as to insure the highest possible degree of strength. This, together with the fact that the clincher fits the rim snugly, precludes the possibility of its becoming loosened under severe strain. It has an uncommonly tough casing which is not easily cut or chipped, and an extra heavy tread to give added durability.

Wridgway's Carburetor.

The sketch herewith shows a carburetor designed by C. J. Wridgway, manager of the Banker Brothers' New York branch. The device is of the float feed spraying type. The float chamber and mixing chamber are cast in a single piece. The sheet metal float A acts on the gasoline needle valve B through the intermediary of two balance levers C C, thus allowing the valve to close downwardly. The gasoline supply pipe connects to the float chamber at the bottom by means of a union D with conical seat.

Within the cylindrical mixing chamber is arranged a throttle valve E. The main air inlet to the mixing chamber is in the cylinder wall at the side, and the gas outlet on top, directly above the spray nozzle. The throttle valve obviates both the main air inlet and the gas outlet simultaneously. The throttle valve has a stem passing through the head plate of the mixing chamber, to which is pinned a



WRIDGWAY'S CARBURETOR.

lever arm F for operating it. An auxiliary air inlet is formed in the head of the mixing chamber. Both the head plate of the chamber and the head of the drum have openings in them, and these openings can be more or less obturated by means of the perforated plate G to which is secured the lever arm H. If for any position of the throttle valve the mixture should not be of the correct proportions, it can be corrected by means of the auxiliary air valve.

Mr. Wridgway intends to cast a jacket around the mixing chamber in the future, as indicated in dotted lines. Through this jacket the cooling water is to be circulated, to facilitate vaporization of the gasoline.

Acetylene Storing System for Automobiles.

In connection with the acetylene lamps now used on automobiles the acetylene gas is generally produced as consumed, by a special generator forming either a part of or being separate from the lamp. A system which is claimed to offer many advantages over this practice has been invented in France, and is now being introduced in America by the Commercial Acetylene Company. The system has already been adapted for use on automobiles, and the sole rights for this branch of its application have been acquired by A. H. Funke, who will exhibit the apparatus at the coming Madison Square Garden Show, as well as in Chicago.

The system has two salient features. The first is the use of porous brick or asbestos with which the tanks are filled to insure safety. Exhaustive experiments in France, and also in this country, are said to have demonstrated that when acetylene is compressed in a tank filled with porous brick, asbestos or other porous substance, it is impossible to produce an explosion even when an electric spark takes place inside the tank filled with acetylene under high pressure. The pressure employed in ordinary practice is about one-seventh of the pressure to which the cylinders or tanks are subjected under test.

The second feature of this system is the combination with acetone, a liquid mobile liquid (CH_3CO), with an agreeable odor and burning taste, produced by the destructive distillation of acetates. It is procured on a large scale from the aqueous liquid obtained in the dry distillation of wood. By saturating the brick or asbestos with acetone the capacity of a cylinder or tank of a given size and under a given pressure is increased tenfold, owing, no doubt, to the capacity of acetone for absorbing acetylene.

Many yachts and a number of automobiles are already using this system; it is stated to have been passed by the marine and fire underwriters as a safe method of using acetylene gas and is allowed by them without any advance in rates of insurance.

COMMUNICATIONS.

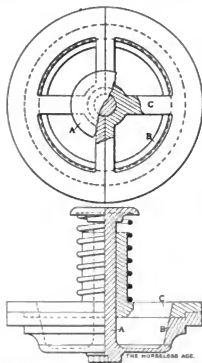
Improved Inlet Valve for Gasoline Engines.

RHINEBECK, N. Y., December 15.

Editor HORSELESS AGE:

The sketch herewith shows an improved inlet valve of the writer's design, of which a number are in use on a Panhard car and are very successful.

The valve proper A, including the head and stem, is made in one piece of suitable metal. All loose pieces are thus done away with. The valve seat B is made of cast iron, in ring form, with an annular recess on the upper side. Into this recess fits the spider C, which can be made of any suitable metal and is split in two diametrically. The shoulder on the recess of the seat holds the spider in position and prevents same from



MORGAN'S ONE PART INLET VALVE.

parting, while the spring (when the complete valve is removed from the seat) holds the whole together. When in the machine the whole is secured in the ordinary way.

To put the valve together, the stem is put through the seat, then the two halves of the spider are put into position and slipped into the recess, and finally the spring is screwed on spirally over the button head or fixed collar on the valve stem.

This construction does away with all wear and increase of valve lift, and reduces the risk of breakage considerably. In addition, the valve may be made somewhat lighter by having the valve stem partly hollow, if desired.

B. MORGAN.

Spark Plugs.

Editor HORSELESS AGE:

In your last issue I read E. D. Pannell's inquiries regarding mica plugs. My experience, which may be of interest to some, is as follows: Having had porcelain break since cold weather set in, I resorted to a mica plug, which worked well until I got some water on it. It then absolutely refused to spark. On examination I found that the fire cement was gone (burned, I think) off the mica a trifle, near the explosion chamber, and in this way the water short circuited the current. Therefore would like to know if high fire test fire cement is susceptible to water? A friend has had four months' use of one plug in a high speed motor. He has platinum jump points on his plug, however, but the plug is of porcelain. I hope to see many accounts of these experiences in your paper.

ELGIN.

The Business Runabout.

Editor HORSELESS AGE:

Your editorial under above title in the issue of December 2 is one of the occasional doubtful notes which encourage the plain, everyday citizen to hope that in due time manufacturers will not be so driven with orders from the buyers of "playthings of an hour," who are really only a small minority of those waiting to hail the "horseless age," that they may have time and patience to listen to the demands of quiet, patient people who do not run after every latest fad, but who, while worrying along with the old reliable "hay" motor, are yet fully alive to the hope of better things, and are all ready for the coming car—when it comes.

I believe I am one of a very large class of men, so large that the present world of automobilists is but a drop in the bucket compared with us, who have watched the development of the automobile with great interest, as their coming deliverer from the bondage of the horse, with all that he represents of caprice of temper and of health, and of unsanitary concomitants, and even communicable disease. He is, except as a pet or a hobby, or for use in places accessible only by the saddle, an anachronism and a nuisance—to be abated as soon as a practicable substitute can be found. The number of people who will readily indorse this position, especially among the dwellers in towns, where the filth and flies and foul odors of stables are certainly only tolerated as necessary nuisances, inseparable from the service of horses, is literally legion. As an humble unit of this legion I visited, when in that city, several of the annual New York shows, talked with agents and manufacturers, and rode in their machines, and I have diligently combed THE HORSELESS AGE for the last four years or so. But I have not bought my machine yet. Possibly the fever might have got the better of me had not uncertainty of residence obliged me temporarily to defer unnecessary en-

cumbrance; but it is true, nevertheless, that I have been easily consoled and willing to wait, in view of the "state of the art," as the patent lawyers call it.

As an engineer, in the building and operation of electric railways, I have been through the "growing pains" of one sort of motor vehicle, and I have been interested to see the automobile builders painfully struggling out of the same pitfalls of insufficient power, unprotected machinery, weak frames, small bearings, small gear teeth, dirt clogged chains, lack of flexibility, unsuitable springs, small piping with unyielding lines and breakable joints, imperfect lubrication, inaccessible parts, etc., which the trolley man had been through before him. And yet, when I have ventured to point out some of these things, I have been met every time with a "we know it all" air of superiority, and the assurance that the machine was all right as it was; and the builders of 2½ horse power machines, with pipestem construction, were just as confident of themselves in their day as successively better ones have been and are since. I am still "sawing wood," and thousands more are doing the same. We are not only doctors, real estate agents and merchants, with orders to take and goods to deliver, and cabmen, and miscellaneous citizens who keep horses for the recreation and convenience of the family, but all of these and many more, who make up the army of horse drivers everywhere. Why, the automobile builders have hardly begun to talk to the great big world of prospective buyers yet, and they can't do so until they get down to business on just the lines you have hinted at in your editorial. When they do there will be no need to worry about "whether the class who want such cars is large enough." They are as the waters of the sea, and the present users of automobiles are as foam on the waves.

Give us a car of simple and substantial construction, with well fitted plain bearings of ample size—no hells; strong front and light afterward; frame and springs and brake and steering gear all fully up to their duty; a body that can be lifted off conveniently, and put out of harm's way when making repairs or general inspection and cleaning—a modified coal wagon scheme would be good, or a ring bolt at each corner, to hook on a tackle, and swing the body up with ease and safety; cushion tires, speed 15 to 20 miles at the best, but able to do that, and to take all ordinary grades, without overstraining, and on occasion to climb surely, if slowly, the steepest road to be found; a fair price for plain, honest goods with no frills, and the market will take care of itself. Of course, there are lots of minor points, but the maker who goes in on these lines will probably be the sort to look out for other things on the same general principles. Make a car for the people and don't be afraid the people will not want it; but do not expect the mass of buyers to look twice at a car that will be worn out by a year's service, or by

two or three, or one that demands half the owner's time and all of his income to keep it in commission and ready for business. I am not unaware of the gain that has been made, and am watching with satisfaction the progress continually made in my direction. I have entire faith that the builders will reach me yet, and I hope before very long; but I have not yet seen my machine.

J. B. HENCK, JR.

Florida Automobile Freight Rates.

DAYTONA, Fla., December 18.

Editor HORSELESS AGE:

The Clyde Line Steamship Company, in connection with the Florida East Coast Railroad Company, have made a through rate on automobiles set up on wheels on the pier from Boston or New York to Ormond or Daytona, Fla., of \$1.75 per 100 pounds, actual weight, released. This is a through rate and does not apply to local traffic.

For those who wish to take advantage of this reduction in rates and bring their cars here it will be well to observe the following:

Allow at least eight days' time for machines to reach Ormond or Daytona from the date the steamer sails from New York and ten days from Boston. It will be better to allow more time when possible.

In shipping automobiles, empty tanks, remove horns or bells, lanterns, tools and other loose parts, and ship them in a separate box; otherwise they are liable to be lost in transportation. Tie a cloth cover over the body of the machine, and attach at least two tags with the proper address, and put the actual weight of each automobile on the tags. There are no scales at either Ormond or Daytona for weighing automobiles. You will save time and money by putting exact weight on each machine.

Daytona is 6 miles south of Ormond. Both towns are near the beach. Good accommodations for storage and repairs at both places. Daytona has two garages, fully equipped, with power plants and modern up to date machinery. New England and the Middle States will find this the best and cheapest route. The Central and Western States can ship automobiles via New York and Clyde Line steamers much cheaper than by rail. Get the freight rate from your home to Clyde Line pier, New York or Boston, add \$1.75 per 100 pounds, and you have the actual cost.

FLORIDA EAST COAST AUTO. ASSOCIATION.

A Cold Weather Experience in the South.

Editor HORSELESS AGE:

A few weeks ago, during a very cold spell, I was called to the phone by a doctor who told me that his gasoline runabout was standing in the road about 3 miles out of town and he could not get it to go and wished I would go out and bring it in. He said the engine ran all right, but the machine would not go. I at once took a few tools and got on a trolley car that ran out in that neighborhood, and found the auto

quite near the car line. The wind was blowing very cold from the northwest, some snow was falling and all the mud puddles (which were plentiful) were frozen up quite solid. I started the engine, and after investigation found the forward gears were loose and could not be used, but the backing gear was all right; so I proceeded homeward backward. I had not gone far before I came to a mud hole that was so large I could not get around it, and took the best place I could find to cross. Then I went down to the hubs and the ice was so thick that it was just like a solid wall, but although my back wheels turned, they would not pull the machine out of the mud hole until I had gotten some boards and broken the ice, and laid the boards down in the mud for the wheels to hold on to.

I got out all right and proceeded backward again for awhile without any more trouble, until I noticed a great deal of water dripping from the machine, and upon investigation found the radiating coils had been frozen and burst and when the water got hot and thawed them out the water ran out. So I made for the nearest place where I could get water, and upon arriving I had no water in the tank or coils, and the cylinder was quite hot, but not enough to hurt it. I then disconnected one of the rubber hose ends from the radiating coils and the other hose end from the water tank and connecting the hose to the tank, cut out the radiating coils entirely; then I filled the tank with water and finished my trip without further trouble.

CHAS. C. KEYSER.

Auto English as Written in Paris.

The following is (according to Henry Norman, M. P.) an extract from a letter from the De Dion Company in Paris to an English customer. The letter was evidently constructed with the aid of a dictionary and the fact that many technical terms have several different significations is largely responsible for the peculiar expressions used:

"For Making the Mover Walking.—Lean on the pointeau of the carburateur until the essence unborders. . . . Push thoroughly the handle on, and hurl the mover till his starting. . . . Increase the advance to the lighter with an eighth of lathe forward at the right; then take sensibly back at left backward the second maniere with a fifth of lathe; just at this moment the mover must goe regularly with 1,500 lathes. . . .

"Raise up again the pedal with ¾, and take completely and progressively back the crowbar of embrayage to you, while you keep the direction with your right hand and the crowbar with the left hand. . . .

"For Going Backward.—When you are at the thoroughly debrayage push the pedal of backward step with your right wheel, and push completely forward the crowbar of embrayage. For the backward step, take back the crowbar in little speed and in debrayage if you will stopped."

The Care and Repairing of a Steam Motor Car.

(Abstract from the fifth lecture before the Boston Y. M. C. A. Auto School, by John H. McAlman.)

CARE OF BOILER.

When first firing up and the steam gauge begins to show pressure, open the blow off valve and blow off a small quantity of water. When the water begins to boil, the sediment at the bottom of the boiler is disturbed and begins to rise, and more of the impurities can be removed by blowing off at that time than at any other, as when steam reaches 50 or 60 pounds this sediment settles back and is not easily disturbed. If these impurities are allowed to remain on the bottom of the boiler they form a non-conducting hard scale, covering the plates and lower ends of the tubes, which interferes with rapid steaming. This cleansing also overcomes to some extent the liability of burning the boiler, as this is too often caused by sediment clogging the circulating system, which includes the check valves on the water column or gauge glass.

The water in the gauge should fluctuate with the motion of the carriage, and when found to remain stationary it is an indication of clogging. This can be remedied by tapping the checks and opening the water column gauge until the sediment is cleaned out. The water in the gauge is the sole indication of the amount of water in the boiler, and it is absolutely necessary that the operator be sure of perfect circulation.

Care should be taken that the packing of the valve in the automatic fuel regulator is neither too tight nor too loose, as in the former case it fails to work promptly, and in the latter is liable to leak. Another source of trouble is the cracking or breaking of the diaphragm, which in such a case should be at once replaced.

The gasoline system should be washed out occasionally in the following manner: Open the torch valve and let a small quantity of cold gasoline through under high pressure. This will soften and remove a portion of the scale and grit. The jet valve on the automatic should be cleaned out from time to time, by unscrewing the jet valve spindle and removing the small plug opposite the jet nozzle. Take a small piece of wire and clean the seal out thoroughly.

CARE OF ENGINE.

Where the steam is in direct contact with the movable parts a special grade of oil is necessary for lubrication, one that will not burn or be decomposed by the heat. Only enough oil should be fed to form a mixture with the steam and keep the surfaces coated. The engine should start easily and without undue grinding or squeaking.

The oil distributed to the external parts should be of such a consistency as to prevent its quickly running off. It is not necessary to have oil dripping from every portion of the engine—a little will perform the same work, and there will be no waste.

Cleanliness is to be strictly observed, and engine should be washed from time to time with kerosene to remove the extra oil and grit.

Before starting a car, after steam is up, the operator should open the throttle slightly and move the carriage slowly backward and forward. This will warm up the engine and drive out the water formed in the cylinders by condensation. This is very necessary, as water in the cylinder (which is incompressible) will often cause bursting of the cylinder heads, stripping of bolts, bending or breaking of connecting rods, blowing out of piston packings, and generally create havoc in the movable parts.

These same results are sometimes caused by too much water in the boiler, so that instead of steam being fed the engine water boils over and enters the engine. This trouble reveals itself in a blowing sound of the exhaust, and a diminution of power, and is commonly called priming.

JACKING OF CARRIAGE TO EXAMINE WEAR ABOUT CHAIN.

The operator should from time to time jack up the rear wheels of his car and run the engine slowly, closely watching the action of the various parts of the engine. All reciprocating parts should be kept in adjustment and a trial of this nature will permit of accurately locating needed adjustments. The pumps and check valves can be thus tested. Check valves should be re-ground from time to time, as may be suggested by an examination of the valve faces, which should be smooth and bright.

BURNER.

The steel tubular burner, which is extensively used, has given very good satisfaction, and is quite long lived. The burner is often blown when the trouble is really in the air mixture and fuel feed, and often a poor burner is benefited by some means of covering it or giving it more air, as the case may require. When the burner fires back, it may be that the mixing tube is not properly adjusted or the jet valve is not in the right position. The true cause can only be ascertained by trying these different changes in adjustment.

TORCHES.

There are various kinds of torches and generators now used, but after having used nearly everything known to the trade I have gone back to the old methods and use the hair pin torch as a standby, as it is always easy to adjust and a sure way of getting a ready vapor.

REPAIRING BOILER.

My experience has failed to teach me any easy way of repairing a boiler on the road. I have heard of such things as putting out meal or some cereal in the boiler to find the leak and stop it from the inside, but I do not consider it advisable to do this, as it is almost impossible to get these substances out again.

I have heard incredible stories of people making quick repairs in caulking boilers with some other parts of the car. If you

wish to fix a burned boiler, my advice would be to carry along proper expanding tools, hammer and other fixtures.

The easiest way to do this would be to stand the carriage on end, letting it rest on the rear springs, and then remove the burner. If the burn is slight, you may be saved the trouble of removing the top hood, and need to simply caulk the bottom. After doing this, you can tell whether or not it is tight by using your hand water pump and filling the boiler with water, pumping it until the steam gauge shows a pressure of about 300 pounds, and if it will remain at this point you may conclude that your boiler is tight. Unless you are an expert in this work, however, I should strongly advise you to notify a machinist and have him take the car to a repair shop and do the work properly.

REPAIRING ENGINE.

There are many things that may happen to an engine that can be overcome temporarily and allow you to get to some repair shop. You have two entirely separate engines, and there are times when it is possible to disconnect one and run on the other. For instance, if you have broken the connecting rod of one cylinder you can centre that cylinder by disconnecting the small rod that joins the links with the bell crank, and move the link block to the centre of the links. Then whittle a piece of wood to fit in the link on either side of the block. At this position the ports will be closed in the cylinder. In starting your engine, the link will act as a walking beam, and will not move the valve stem enough to uncover the ports. This proceeding has been demonstrated to be perfectly safe.

Another way to secure the same result is to disconnect the eccentric rods and tie them up, and then see that the valve slides cover the ports, and block the stem so that it will keep in position.

Start the steam and you will find that you can get under way with one engine. Before starting engine, be sure you have removed the broken connecting rod, to prevent it from being caught in the engine, as the crank will move it the same as before.

PREPARING CAR FOR STORAGE.

When a boiler is not to be used for some time, all water should be drawn off, and it is then advisable to take a small quantity of sal soda—about a cupful—dissolve it in warm water, and pump this into the boiler. Then fill the boiler nearly full of clean water, start a slow fire, gradually bringing the water to the boiling point, and continue the fire for about ten minutes. Turn out the fire and blow off the boiler until dry. This leaves a coating which prevents further rust, and thus prolongs the life of the boiler.

The water system should be carefully drained. This can be done by opening the valve at the bottom of the water column,

and the small pet cock which is usually placed below the pumps. If the car is equipped with steam water pumps, great care should be taken that they are thoroughly drained, and oil worked into the cylinders and valves. I would strongly advise disconnecting these pumps and putting them in a dry place, as the mechanism is very delicate and requires careful attention in order to get good results. It is also advisable to cover all nickel parts with vaseline. The engine should be cleaned and well oiled.

It will pay to remove the steam chest cover and see that it is dried and well oiled. It is well to put trussels under your car to keep the weight off the tires. If a car is left in this condition you will find it in good order in the spring. When the car is to be used again it should be fired up and blown off before beginning to use it regularly, as otherwise the deposits of soda will cause foaming in the boiler, incorrect registration in the gauge and priming through the engine.

"The Air-Cooled Motor."

John Wilkinson, engineer of the H. H. Franklin Manufacturing Company, gave a talk on air cooled motors and on the Franklin car, at the Long Island Automobile Club, Brooklyn, on Wednesday evening, December 16, before quite a large audience.

Mr. Wilkinson said that the air cooled motor had first been extensively used in France. It had been built in sizes up to about 3 inches bore and been employed to propel a weight of from 600 to 700 pounds. To obtain from a cylinder of that size enough power to propel such a weight at a suitable speed it was necessary to run the motor at a very high speed, up to 2,000 revolutions per minute. Under these conditions the air cooled motor had failed. The way to make it a success was to require less of it. For instance, in the Franklin car they had to propel a weight, with passengers, of 1,400 pounds, and for this they had four cylinders of $3\frac{1}{4}$ inch bore each, so that each cylinder had to propel a weight of only 350 pounds, or half as much as the 3 inch cylinders of the early French air cooled cylinders were expected to do. This allowed them to run the motor at a lower speed—1,000 revolutions per minute normal—and give the cylinders a chance to get rid, during the period between explosions, of the heat absorbed during the power stroke.

In reply to a question Mr. Wilkinson said that there was less danger of the piston sticking in the cylinder in an air cooled motor than in a water cooled motor, because this sticking was not due to heating of all parts, but to greater heating of the piston than the cylinder. In an air cooled motor, if the piston heated more than normally, the cylinder would also heat more, and the expansion would always be proportional, whereas in a water cooled motor the temperature of the cylinder wall was limited

by the water surrounding it. They, of course, occasionally had a piston stick in a new machine where the piston had been fitted too tight, and the following experience, he believed, demonstrated that as regards sticking, the air cooled motor had an advantage over the water cooled: On one of their cars a piston which had been fitted too tight would stick when the car was run on the high gear, in which case the cooling facilities were best, while it was impossible to cause it to stick when the car was run on the low gear, as then the cooling facilities were impaired, the cylinder got hotter and expanded more, and prevented the sticking. As soon as the car was run on high gear the piston would stick again.

The air cooled motor, it was explained, works at a higher cylinder temperature than the water cooled motor. For this reason it requires more lubricating oil, as with the higher temperature of the cylinder walls the oil burns away quicker. How much more oil an air cooled motor required than an equivalent water cooled motor was hard to say. The higher temperature had an advantage in that it gave greater efficiency, for some of the heat which in a water cooled engine was lost through the water jacket was here saved and turned into useful work. The compression which could be employed in an air cooled motor was limited—according to their experience to about 70 pounds per square inch—by the danger of preignition at higher compressions, and while this might be thought to be a disadvantageous feature of air cooling, owing to the fact that the thermal efficiency and motor power increase with the compression, in practice it was not, as few water cooled motors used a greater compression than 70 pounds. At normal speeds an air cooled motor gave more power than a water cooled motor, for equal compressions, owing to the higher efficiency of the air cooled motor resulting from the higher cylinder wall temperature, but if the speed of the motors was pulled down the power of the air cooled motor dropped below that of the water cooled motor, as at very slow speeds the air cooled motor was naturally hotter than otherwise, and as the incoming charge was in contact with the hot walls a longer time, it was heated and expanded more, and consequently a smaller amount of it by weight was admitted per cycle.

Mr. Wilkinson called attention to the fact that it is convection and not radiation which is depended upon for disposing of the heat in an air cooled motor, and that in a water cooled car also the heat absorbed by the cylinder walls is in the last place disposed of by air convection; therefore, if as much cooling surface could be obtained on the cylinder of an air cooled engine as was usually provided in the radiator of a water cooled engine, the air cooled engine would operate at the same temperature as the water cooled. This was impossible, however, but there was really an advantage in operating at a higher cylinder temperature than is usual in water cooled motors.

The size of air cooled cylinders was, of course, limited by the ability to get rid of the heat. If the height of the fins was increased in the same proportion as the linear dimensions of the cylinder, the proportion of cooling surface to heat to be disposed of remained constant, but when the fins became higher the cooling surface grew less effective.

For valves they had tried different nickel steels, but had found them no better than ordinary steels; cast iron was one of the best materials for valve heads. French manufacturers of air cooled motors had used both pure nickel and nickel steel alloys for valves.

In the description of the Franklin car, Mr. Wilkinson, in answer to a question, said that the cylinder bore was made of the same diameter throughout the length of the cylinder. The pistons were made three thousandths of an inch smaller in diameter than the cylinders over the body part and eight thousandths smaller at the head. They had four concentric rings, two near the rear end and two near the front end, which were ground to true circular form after being split and sprung together, and were free in their grooves—that is, not held by pins from rotating.

At the conclusion of the talk by Mr. Wilkinson, a "smoke talk" was indulged in, led by Harlan W. Whipple, candidate for president of the A. A. A.

Book Review.

Fowler's Electrical Engineer's Year Book, 1904.—The Scientific Publishing Company, of Manchester, England. Price, post free, 1s. 9d.; superior binding, gilt edges, 2s. 9d.

This book is a companion work to the Mechanical Engineer's Pocket Book, of the same publisher, reviewed in *THE HORSELESS AGE* several weeks ago. It contains in condensed form the theoretical electrical knowledge which the practicing engineer has to make use of, standard tables of conductors and cables, conductivity, and magnetic permeability, and practical data pertaining to the various branches of electrical engineering, including lighting, traction and electric transmission. We fail to find any mention of electric automobiles. A chapter on storage batteries, though short, comprises a paragraph on the Edison battery, showing that it is up to date. The concluding portion of the technical part relates to steam power plant and belting, thus taking account of the needs of the station engineer. A list of lighting and power stations in England, with particulars of their equipment and service, concludes the book.

Trade Literature Received.

The Steel Ball Company, 832-840 Austin avenue, Chicago—Circular on the Hill automatic starter for gasoline automobiles.

The Induction Coil Company, Miller Building, Milwaukee, Wis.—Circular and price list of Miller jump spark coils and Sta-Rite spark plugs.



John Crane has opened an agency for the Knox cars in Chicago.

Horace B. Day has retired from the Cadillac Company, of New York, and John T. Cutting will continue the business alone.

It is reported that W. H. Wilkinson is building a factory at Haverhill, Mass., to manufacture a three cylinder gasoline car.

H. C. Martin, of Porto Rico, representing the Knox Automobile Company, will run an automobile line from Ponce to San Juan, Porto Rico.

The third annual automobile show of the Automobile Club of Philadelphia will be held in the Second Regiment Armory the week of January 25.

An auto stage line will be operated between Northhoff and Ventura, Cal. A 35 horse power machine, carrying nine passengers, will be used.

The Winton Motor Carriage Company have leased the land adjoining their garage on Huron street, Cleveland, and will put up a large brick building.

The Ohio Motor Car Company, of Cleveland, Ohio, will change its station from the Temple Block, on Huron street, to the Loew Block, on Erie street.

The Rushmore Dynamo Works, of Plainfield, N. J., have made arrangements with the Ansonia Motor Car Company, 1064 Broadway, to carry their line of goods in New York.

Chas. D. Shain, 70 Murray street, New York, is making specialties of a graphite lubricant made by the Wisconsin Graphite Company, Pittsburg, Pa., and a chain and clutch grease of his own manufacture, called "E-Z-Clutch."

The Springfield Automobile Club has decided to hold an automobile show and a race meet at Hampden Park next spring. The invitation to the club to join the Massachusetts Automobile Association will probably be accepted.

Fred P. Brand, special representative of the Locomobile Company, who has recently returned from a trip to Cuba, states that conditions in Cuba are somewhat against the sale of automobiles. The roads around Havana he reports as not altogether bad.

E. B. Meyrowitz, 104 East Twenty-third street, New York, is manufacturing the "Nostare" aluminum auto goggles, having extra large curved lenses permitting the wearing of eyeglasses inside and fitting snugly to the face, excluding dust and wind.

The Thomas B. Jeffery Company have protested against the action of the National Association of Auto Manufacturers in awarding gold medals to eight cars and barring their car from an award. The N. A. M. gave the Columbia car a medal, but

barred the Rambler from the same honor, although both cars failed to make the Buffalo control for practically the same reason.

Frank Ward has secured the Winton agency for Rockford, Ill., and Herbert Ticknor the Ford.

The directors of the Berwick Auto Car Company, with a factory at Hastings, Mich., expect to reorganize the concern.

The Centaur Motor Vehicle Company, Buffalo, N. Y., has mortgaged its property on Franklin street to Lucy Broad for \$17,500.

L. D. Parker has resigned the presidency of the G & J Tire Company, of Indianapolis, and will be succeeded by Harold O. Smith.

L. C. Riggs and L. E. Ellsworth, Chattanooga, Tenn., were run into and fatally injured by a street car while driving an automobile recently.

The bankrupt stock of the I. A. Weston Company, of Syracuse, N. Y., has been sold to Calvin McCarthy, of South Onondaga, N. Y., for \$6,075.

The New York State Automobile Association held a meeting at Albany on Saturday, December 19, to complete its organization and to elect committees.

The Cincinnati branch office and repair shop of the Diamond Rubber Company has been removed from 403 South street to larger quarters at 1559 Gest street.

Leischer Brothers and Henry Bierman have formed a company at Luverne, Minn., to build gasoline runabouts, surreys and delivery wagons. The factory will be opened the first of the year.

The State Grange of Illinois recently passed resolutions demanding that automobiles be classed as traction engines and the same law apply to both, compelling them to stop when meeting teams on the public highway.

The annual meeting of the National Association of Automobile Manufacturers will be held on Thursday, January 21, 1904, at 12 m., in Madison Square Garden. The annual dinner will take place at the Café Martin January 22.

The automobile garage formerly run by Barry & Hayes on Fifty-eighth street, near Madison avenue, New York, has been opened by the Tuxedo Auto Station, Inc., with Edward Hayes, president, and C. A. McGinley, secretary and treasurer.

The American Automobile and Power Company, Sanford, Me., will build about 800 two cylinder, 12 horse power touring cars. The features of the cars are that the engine is carried in front under a hood and the flywheel is carried between the two cylinders.

Ralph Temple & Austrian Company are erecting a new garage on Michigan avenue, Chicago, opposite the Logan monument in Lake Front Park, which is quite close to what is known as "automobile row." The building has a frontage of 78 feet, and will be equipped with a 50 horse power electric

generating set for light and power, an elevator, etc.

A permanent auto club is to be formed at Nashville, Tenn.

Early in the spring a permanent automobile club is to be organized at Des Moines, Ia.

At Little Rock, Ark., the speed of automobiles has been limited to 8 miles an hour.

It is expected that H. B. Shattuck & Son, Boston, Mass., will endeavor to compromise at 25 cents on the dollar.

We acknowledge receipt from the Automobile Club of California of a photograph of the trophies awarded in the recent San Francisco races.

Walter & Co., 49 West Sixty-sixth street, New York city, are now putting through fifty of their 1904 models, containing many new features.

E. J. Phelps, president of the Minneapolis Automobile Club, will leave next month for a four months' European tour in his Knox automobile.

The Jones-Corbin Company, Philadelphia, Pa., recently bankrupt, has been reorganized under the name of the Jones-Corbin Automobile Company.

Geo. R. Moran, of New York city, is working on a tractor for agricultural use equipped with a 14 horse power explosion motor using as fuel ordinary kerosene.

Clark Sintz, Grand Rapids, Mich., has executed a mortgage covering all his assets to the Michigan Trust Company, same city. His total liabilities are said to be about \$17,000.

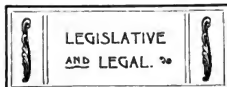
Chester I. Campbell, E. O. Mosher and Henry O. Long, representing the American Automobile and Power Company, are endeavoring to locate an auto factory at Sanford, Me.

The storage and repair station of F. E. Avery, Columbus, Ohio, was recently destroyed by fire, entailing a loss of about \$30,000, covered by insurance. The Avery Company have a new plant in course of construction.

A club is proposed by the automobile owners of Dallas, Tex., and the matter of arranging for its organization is in the hands of a committee consisting of George A. Titterton, Henry Garrett, George Collins and A. Templeton.

Frank V. Whyland and Clarence B. Hollister, employees of the Stanley Electric Company, Pittsfield, Mass., are building a working model of a 9 horse power gasoline runabout. A company to be known as the Berkshire Automobile Company will be organized to manufacture these cars.

A new form of policy is to be issued by the Northwestern National Insurance Company, of Milwaukee, Wis., excluding gasoline automobile risks from the usual barn contents, having a clause exempting the company from liability when damages result from a fire originating within the machine, and charging an additional rate when an automobile is housed in a barn.



Constitutionality of Pennsylvania Automobile Law Attacked.

The first attack upon the constitutionality of the Pennsylvania automobile law was made by defendant's attorney in the trial at Erie, Pa., December 1, of the case of the Commonwealth against Louis Farrar et al., who had been convicted at the last session of Quarter Sessions for having operated automobiles on the streets of Erie without having first paid an annual license tax and secured registration papers. He showed that the title did not cover the subject matter embodied in the law, and claimed that Sections 6, 9 and 13 were unconstitutional. In brief his argument was that the law in its title provided for a license for the operator, and in Section 6 provided that the license must be issued to the owner; that the law discriminated between two classes of citizens, in that it does not apply to agents of companies having automobiles in stock, who are exempt from obeying the speed regulations, while any other individual is limited to a speed of 8 miles an hour. This is discrimination and therefore nullifies the law; there is no authority in the law for the prothonotary to issue a license to an operator, as Section 2 of the new law plainly says the applicant for registration must set forth the name and residence of the owner or owners, the name of the manufacturer and the manufacturer's number of the motor vehicle to be registered.

He rested his case upon the unconstitutionality of Section 6, which conflicts with the title, and on a decision rendered in New York State, declaring the New York law unconstitutional, because it discriminated between the private owner and the manufacturer. He claimed automobile manufacturers evidently had cleverly managed to have Section 6 of the Pennsylvania act so worded in committee that the entire law is made unconstitutional.

In reply the State contended that the law applied to owners and operators of automobiles who used the machines in order to provide for their own pleasure; that the manufacturer could not be expected to register every machine he had to sell, and, therefore, discrimination could not be alleged; that the law was passed to protect pedestrians using the highways and to put the authorities in possession of the names of the owners of the machines, and that the machines owned by corporations and held in stock were not within the mischief sought to be remedied.

In the suits of J. C. B. Woods and Frank Ennis against the Old Colony Railroad for damages alleged to have resulted from a collision at Seekonk, Mass., be-

tween an automobile owned by Mr. Woods and a car belonging to the railroad, the jury returned a verdict of \$4,200 for Mr. Woods and \$1,742 for Mr. Ennis.

Attorneys for S. M. Reynolds in his suit against John Buck for damages for injuries resulting from the careless operating of an automobile by defendant's son, have appealed upon the ground that the presiding judge erred in instructing the jury to return a verdict for the defense.

A representative of the Columbus, Ohio, automobile owners at a hearing before the judiciary committee on December 1 favored an ordinance providing for the numbering of machines and the strict enforcement of speed regulations, 7 miles within and 14 miles an hour without the business districts. Some of the committee favor the same speed for all parts of the city.

At the trial of an appeal of the case of Samuel Bell, Jr., who was recently fined \$10 for running his automobile faster than 10 miles an hour in Haverford, Pa., defendant's attorney contended that a township has no right to frame such an ordinance, and that it is void because it was repealed in 1901 by an act which gave automobilists the privilege of going at a speed of 20 miles an hour.

The Kansas City (Mo.) lower council has passed an ordinance limiting the speed of automobiles to 6 miles an hour within the district bounded by the Missouri River, Fifteenth street, Locust street and the State line, and to 10 miles an hour elsewhere within the city limits, and making the first violation punishable by a fine of not less than \$5 nor more than \$500, and the second by a revocation of the offender's license.

The mayor of New York on December 21 gave a hearing to those interested in the regulations recently proposed by the municipal explosives commission. Representatives of automobile garages said they would be unable to do business if limited to the commission's requirement that not more than 10 gallons of gasoline be allowed in storage in any depot. They explained that the gasoline companies will make only two deliveries a day.

The Metropolitan Park Commission, of Boston, has established a set of rules excluding automobiles from reservations except upon town or country roads therein, and upon Hill Side street in Blue Hills Reservation, Turtle Pond road and Bold Knob road in Stony Brook Reservation, Charles River road in Watertown in Charles River Reservation, the border road in Middlesex Fells Reservation and all roads in the Winthrop Shore Reservation, and from all parkways except upon Middlesex Fells, Revere Beach, Mystic Valley, Fresh Pond and Blue Hills parkways, and limiting the speed where automobiles are allowed to 10 miles an hour. For violations the operation shall be arrested and pay a fine of not exceeding \$20 for each offense.

Club Notes.

LONG ISLAND A. C.

The annual election and banquet of the Long Island Automobile Club of Brooklyn, N. Y., was held on December 9. The slate previously published was elected.

CLEVELAND A. C.

The week beginning February 29 has been chosen by the Cleveland Automobile Club for its second annual automobile show at the Grays Armory. Owing to the fact that the available space in the armory is limited, the club's show committee urges members of the trade desiring to secure space to file their applications early.

NEW HAMPSHIRE A. C.

Reginald C. Stevenson, president, and Charles G. Sheldon, secretary of the recently incorporated New Hampshire Automobile Club, Exeter, are circulating widely through Southern New Hampshire and Northeastern Massachusetts a prospectus outlining the club's plans for the purchase of the Leonia Hotel property at Hampton, where it is proposed to build a fine clubhouse.

A. C. OF NEW JERSEY.

The annual meeting of the Automobile Club of New Jersey was held in East Orange on December 14. The election of officers for 1904 resulted as follows: President, George Farrington; vice president, Arthur Baldwin; treasurer, Richard Stren, and secretary, C. H. Gillette. Governors, James B. Dill, G. Franklin Bailey, Winthrop E. Scarritt, A. B. Leach and Dr. A. C. Christian.

NORTH JERSEY A. C.

The North Jersey Auto Club has elected the following officers: William E. Scudder, president; Frank Eveland, vice president; Joseph H. Gilmore, treasurer, and Wm. C. Glass, secretary. Governors, 1904 class: S. Hague, W. R. Starrett, G. A. Randel, K. W. R. Koester, A. G. Armstrong and C. W. Lohmeyer; 1905 class: A. J. Lowe, George H. White, Frank C. Dickson, Dr. H. R. Simmons, C. E. Emerick and J. H. W. Lemkaw.

M. C. OF NOVA SCOTIA.

On December 5 Dr. Slayter, Major Biddulph, Capt. J. M. Allen, G. E. Foster, Frank Hills, C. L. Newman, H. H. Dunn, C. H. Brecker, R. Howard, W. L. Kane met at Halifax and organized the Motor Club of Nova Scotia. A committee, consisting of Messrs. Kane, Slayter, Biddulph and Hills, was appointed to wait on the city council with the object of having the objectionable features of the proposed ordinance eliminated. Officers were elected as follows: President, W. L. Kane; vice presidents, Dr. H. Slayter and W. Marshall Black; secretary and treasurer, Frank Hills.

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Anti-Friction Bearings for Transmission Gears.

The use of ball and roller bearings on the axles of automobiles has been steadily progressing during the last few years, simultaneously with the improvement of these bearings for heavy load carrying purposes. It seems somewhat surprising, therefore, that so little has been done in the application of these bearings to transmission gears. To be sure, it has not yet been finally decided whether plain or anti-friction bearings will eventually rule in automobile construction—whether the less frequent need of adjustment of the one or the saving in power of the other is the more desirable feature. But if the application of ball or roller bearings to the axles is justified by the results, the use of these bearings on the transmission gear shafts would seem to be equally advantageous. There is not the same load or pressure on the transmission gear bearings as on the axles, and consequently not the same friction, but the transmission shafts run at so much greater speed than the axles or wheels that the friction losses at their bearings may well be as great as those at the axle bearings.

The use of ball bearings would be particularly advantageous in transmission gears in which the power is transmitted from one shaft to another, even for the high gear—that is, which have no direct drive. At least one American machine has such a gear equipped with ball bearings. On the planetary gear the anti-friction bearing seems to be out of place, owing to the difficulty of getting at the bearings for purposes of adjustment.

One of the reasons why anti-friction bearings are used so generally on axles and so little on transmission gear shafts is undoubtedly that many automobile manufacturers buy their axles complete from parts manufacturers who either man-

ufacture the anti-friction bearings themselves or have business relations with some manufacturer of anti-friction bearings, while the automobile manufacturers usually build their transmission gear complete themselves, and it is, of course, an easier matter to design a suitable plain bearing than to design a suitable anti-friction bearing.

Advanced practice abroad seems to be in the line of anti-friction transmission bearings, and it is likely that the subject will receive more consideration here in the near future.

Caution Necessary in Shipping Water Cooled Cars in Winter.

Despite the fact that the automobile journals at the beginning of cold weather draw attention to the necessity of guarding against freezing of the cooling water in the engine jacket, radiator and tanks, much damage resulting from neglect of this point is reported each year. It has been noticed that most of this damage occurs in Southern localities where sharp frosts are an exception. In the North, where freezing temperatures are the rule during a protracted period, and where at the beginning of cold weather steps must be taken to protect various objects around the house from damage by the cold, automobilists seem less likely to neglect their machines in this respect.

A report has just been received from Southern California that seven automobiles shipped there from Detroit some time ago arrived with cylinders cracked and radiators similarly damaged, because the shipping department of the factory had neglected to drain the water from the cooling system.

This case affords another illustration of the assertion made above, that most of this trouble occurs in the South. Of course, it must not be inferred that the freezing occurred in Southern California,

but the fact that the cars were being shipped to a Southern destination may have been responsible for the neglect of those who prepared them for shipment. The damage, which had to be made good by the manufacturer, in this case amounted to considerable, and the experience likely will be held up as a lesson for others.

British Trial of Anti-Skidding Devices.

There is a growing tendency abroad to organize trials and competitions for some special part of motor cars in which improvement is most needed. The latest event in this line is the Side Slip Competition which the Automobile Club of Great Britain and Ireland will hold next spring. Many devices for preventing side slip have been placed upon the market, especially abroad, but the automobile public does not seem to regard them with complete confidence. Aside from the question of their effectiveness as preventers of side slip, a number of other questions have to be considered in determining the practicability of the devices. Some of the devices already offered evidently affect the life of the tires, while others affect the resiliency of the tires or have a deteriorating effect on the road surface. Devices entered in competition which give promise of practical value will be investigated from all these different points of view, and, moreover, a system of elimination has been planned, so that only those devices which give promise of practical results will be subjected to thorough tests. In view of the fact that such accessories competitions will probably be more numerous in the future, we would call special attention to this system of elimination.

In a line which has been so little developed as that of anti-skidding devices many impracticable ideas crop up. The announcement of the competition itself is likely to set many inventors working and produce ideas which would be seen at first glance to be impracticable by an automobile expert. To subject such apparatus to the same painstaking tests as would be necessary to determine the comparative value of really promising inventions would be a waste of effort. Hence the committee in charge of the competition will first judge the practicability of the devices submitted from drawings, and those approved will be admitted to the preliminary trial, which will consist of a run on greasy sur-

face over a tortuous course to be covered in a certain time. Devices passing successfully through this preliminary trial will then be subjected to the final trial or endurance test, consisting of a run of not less than 500 miles.

It appears from the regulations, although not definitely stated, that the preliminary trial is to determine the effectiveness of the devices entered as preventers of skidding, and the final trial is to establish their durability and their effect on the wearing quality of other parts, such as tires.

It should be mentioned that part of the entry fee for devices which are eliminated will be returned. In judging entries, those which are always available will be considered superior to those which are to be applied to the car only when the roads are exceptionally greasy.

Some Competitions Needed in This Country.

It occurs to us that a number of trials on the lines of the British Side Slip Competition would be hailed with satisfaction by American automobilists. For instance, a trial of kerosene burners and a trial of cushion tires would fill a widely felt want, and some enterprising club could do the automobile world a real service by organizing such trials and carrying them through in a practical, businesslike manner. There are numbers of users of steam cars who are anxious to fit them with kerosene burners, but hesitate because they fear they may purchase an impractical burner, so little reliable ex parte information being obtainable on this subject. Instances have been reported of kerosene burners proving unsatisfactory, but we know from personal experience that this has not always been the fault of the burner. On the other hand, very encouraging reports of kerosene burners are frequently heard of late, and the indications are that constant and substantial progress is being made in this line. Under these conditions a competition for such burners would be of much timely interest and would benefit the industry of kerosene burner manufacture as well as users of steam cars; in fact, it would benefit the entire steam vehicle industry, as it is generally recognized that a thoroughly practical kerosene burner would largely improve the chances of the steam car in competition with the gasoline car.

The cushion tire is also regarded with feelings of doubt by a large body of users,

many of whom would gladly avail themselves of the insurance against punctures and tire bursts which it offers were they certain of its durability and the sufficiency of its cushioning effect. In this particular, too, the degree of success achieved by different users differs widely, and it would be impossible to draw any more definite conclusion than that the cushion tire is a success under certain conditions. These conditions are rather complex and incapable of precise statement. An endurance contest for cars fitted with cushion tires would therefore offer possibilities of observing and fixing these conditions, and at the same time of determining the relative merits of the various tires.

Here, it would seem, is a chance for some of the smaller automobile clubs to do some valuable work in the interest of the automobile movement. Clubs located in an automobile manufacturing centre and having many technical men among their members would be particularly eligible. In this connection it should be mentioned that some of the French provincial clubs have been conducting successful trials of this nature. Thus, for instance, the A. C. du Rhone, located at Lyons, held a successful competition for searchlights last summer.

N. A. A. M. Elections.

There are indications that the division in the industry which has resulted from the Selden patent movement will lead to factionalism in the National Association of Automobile Manufacturers. The association will hold its annual election of officers next month at the time of the Madison Square Garden Show, and the present officials, with one exception, have been renominated by the committee. The ticket does not seem to meet general approval, however, and the active members of the association have been circulated by a member with respect to their views regarding a change in the policy of the association and the need of greater activity. These considerations are evidently to be made the excuse for nominating an opposition ticket. As the member who issued the circular is a gasoline car manufacturer outside the Selden fold, and as the apparently very close relationship of the N. A. A. M. and the A. L. A. M. has often been remarked of late, many individuals being officials in both organizations, it seems natural to suppose that the Selden war is at the bottom of this movement.

Present Status of the Automobile Truck—II.

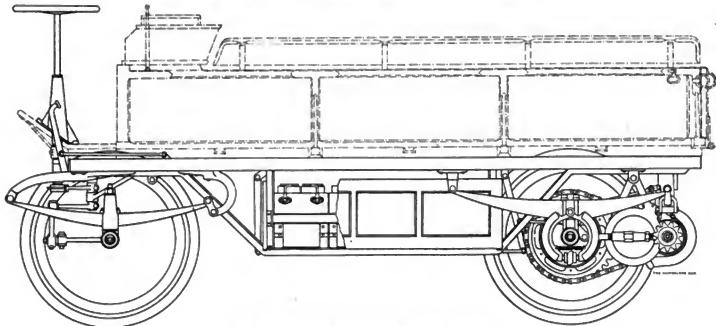
BY WILLIAM P. KENNEDY.

STUDEBAKER ELECTRIC TRUCKS.

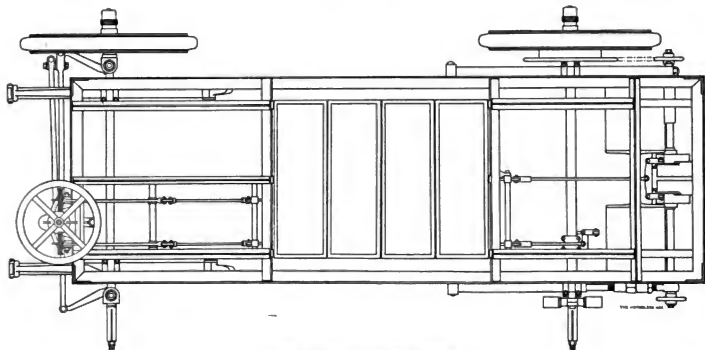
The Studebaker Brothers Manufacturing Company are about to enter actively the field of heavy commercial vehicles,

accordance with current practice, all the mechanism is attached to the main frame, allowing substitution of various styles of upper body. The same general method of construction is followed in all sizes, with the exception that in the smaller machines single reduction is used, the motors being geared directly from the armature shafts to the wheel sprockets.

in the arrangement of members is practically new, since the usual method is to construct a rectangular frame and make the battery compartment simply an addition suspended from the main member. This method gives the advantage of rigidity to the general structure, which is particularly desirable in the heavier machines.



SIDE ELEVATION OF STUDEBAKER ELECTRIC TRUCK.



PLAN OF STUDEBAKER ELECTRIC TRUCK.

being prepared to build machines of from 1,000 pounds to 4 tons carrying capacity. The design which they have finally evolved, after an extended period of exhaustive tests, is shown in the accompanying illustrations. It embodies the latest developments in this branch of engineering and has some novel features. In

As shown, the frame is built from angles and tee section steel, so disposed as to give the maximum strength with the least possible weight.

The battery is under the centre of the frame, and the battery compartment is built integral with the frame, the whole forming an inverted truss. This feature

The motors are placed to the rear of the rear axle, suspended from the body frame, and transmit their power to the wheels through a geared countershaft, which in turn drives the wheels through the medium of sprockets and chains.

The brakes consist of two independent sets, one operating on the motor counter-

shaft, and the other, an internal expanding brake, operating on the inside of a drum attached to the spokes of the wheels.

The wheels are of the Archibald pattern, with parallel hardened axle bearings, running in removable bushings in the hubs. The wheels of all models are 36 inches in diameter, equipped with solid rubber tires of a width corresponding to the load to be carried.

The steering gear is of the common wheel type, operating through pinion and segmental spur gear. The steering pivots are hardened and ground, both on the wheel bearing and the steering pivot parts. The front axle is bushed in the pivot sockets, the lower pivot being tapered to allow adjustment for wear. All steering pivots and pins are case hardened and provided with oil cups.

Lubrication of the motors is effected by absorbent pads, as is common practice in street railway motors.

The controlling system is a series parallel arrangement of motors and motor fields, which permits the battery to be always in series grouping. The controller handle is located at the left of the driver's seat, and has four speeds both forward and reverse.

The battery is divided into four trays containing ten cells each. This arrangement is preferable to the single tray, because in ordinary delivery service one tray containing a diseased cell may be temporarily put out of commission and another substituted, without tying up all the remaining cells in the battery. This consequently reduces the expense of extra batteries necessary in the upkeep of a number of electric automobiles, and in the case of single machines an extra section will be found to perform the function of an entire battery during the process of cleaning.

The subdivision of the battery into four interchangeable parts is a feature which has been earnestly advocated as a means of keeping the vehicle in continual service without investment in a second battery, as by the addition of one-fourth of the equipment the battery may be systematically examined, cleaned or repaired section by section. It may also be pointed out that with such a system of battery subdivision it would be quite feasible for central stations or battery firms to maintain vehicle batteries at fixed charges. By withdrawing from service consecutively each section of the battery for station treatment at regular short intervals, an even, normal condition could be maintained at a definite cost. Of course, there are theoretic objections to this plan, but they are outweighed by the practical advantages gained. The prevailing opinion among the present owners of commercial electric vehicles is that some such scheme will be necessary to the solution of the battery problem, which is one of vital importance.

(To be continued.)

Aluminum Carriage Bodies.

Never since the production of aluminum has been put on a commercial basis has the metal been used as advantageously as in the manufacture of carriage bodies. Its adaptability to this use has completely revolutionized the art, and opened up possibilities for a new line of architecture in carriage body building.

Although there will be a number of special designs out, it is very evident that the prevailing 1904 styles will be the "King of the Belgians" and the "Standard." The latter refers simply to designs of such straight lines as may be obtained in construction without altering the shape of the metal, except by bending same as thin sheet iron can be bent. These shapes are comparatively easy to obtain, and their cost of production is therefore moderate.

The "King of the Belgians" bodies, on the other hand, can be constructed only by beating the metal in the same manner as a copper or gold beater constructs the various utensils in his art. This beating brings the molecules of the metal into closer contact, which gives a stronger material, much more capable of resisting wear and tear, the same as hammering iron or steel gives these metals added strength.

There are three distinct styles for "King of the Belgians" bodies—the so called concave, convex and the double roll (cymna recta). The latter, when properly proportioned, is at once the handsomest and the most difficult shape to construct. The fact that each of the four sections must be beaten separately and all be of exactly the same proportions renders the task doubly difficult, and places it far above the ordinary metal worker's craft. Owing to the fact that the work is hand work, and that sometimes whole sheets nearly completed, upon which a large amount of labor has been expended, are ruined by being beaten too much, the same as occurs in the gold beater's trade, the cost of production is increased materially. However, a good portion of the present automobile public demands what it fancies, regardless of cost, and the demand is largely for this style of body.

The possibility of constructing these shapes by machinery is receiving serious consideration, which would greatly reduce the cost of manufacture, but as this would require very expensive and intricate dies for such particular shape, there would naturally have to be a great many bodies made from each die to materially lessen the cost, and at the present rapid evolution of shapes or styles it would take some time before the styles could be brought to some recognized standard, so that machinery could be of any practical use in their manufacture. The lower priced bodies form an exception, as these naturally have to be of some standard to make their low cost possible.

Economy of space and weight, which the aluminum body makes possible, is a matter of great moment, and worthy of

serious consideration, as each ounce of unnecessary weight means so much more power required to move the car, while the extra space can be made use of to good advantage in providing greater comfort for the passengers.

Where a wood framework is used to fasten the sheets of aluminum to the saving is comparatively small, but when the framework is constructed of aluminum channels and angles it is considerable. With the wood framework there is a difference of expansion between the frame and the panels with changes of temperature, thus creating a strain between the two which does not occur in a body with a framework of aluminum channels. The latter method therefore represents superior construction.

An important factor in the advantages of the aluminum body is its greater durability. The greater tenacity of the metal makes the joints of the panels to the framework more secure and less liable to injury from shock and jar. In wood bodies it not infrequently happens that a panel is cracked, necessitating the renewal of the panel or of the entire side, to save appearances. In an aluminum body any dents which may accidentally be made in the panels can easily, quickly and inexpensively be taken out again by beating, unless the panel is actually broken, and the surface restored to its original degree of perfection.

Aluminum as it comes from the mill will not hold paint, but must be chemically treated or roughed with a sand blast, when it will hold the paint better than wood. Aluminum being non-absorbent, all the moisture in the paint must dry out, and this is claimed to produce a smoother and more durable surface than can be obtained with wood. Further, aluminum is impervious to moisture, and as the elasticity of the paint more than compensates for temperature expansion and contraction of the aluminum, there is no cracking of the paint or peeling off to contend with, as often occurs in wood bodies when the wood swells with moisture or contracts from dryness.

Process for Bronzing Cast Iron.

The *Maschinenbauer* describes the following process for imparting to common cast iron all the rich glow of bronze, without covering it with a metal or an alloy. Having thoroughly cleaned the surface and rubbed it down smooth, apply evenly a coat of vegetable oil, say, sweet or olive oil, and heat the iron object, being careful that the temperature does not rise high enough to burn the oil. At the moment of decomposition of the oil the cast iron will absorb oxygen, and this forms upon the surface a brown oxide skin or film, which takes a fast hold and is so hard that it will admit of a high polish, thus bestowing upon the iron a most striking resemblance to bronze.



Pipe Connections.

The piping system is a very important part of any gasoline or steam car. On gasoline cars pipes or metal tubes are used for conveying lubricating oil, gasoline, cooling water, explosive charge and exhaust products; on steam cars they are used for cars carrying oil, gasoline, feed water and steam. Some of these fluids are carried under high pressure, which necessitates considerable care in keeping the piping tight. Another factor which tends to cause the piping to become leaky is the constant vibration on a car.

For moderate pressures and temperatures of the fluid conveyed seamless brass or cop-

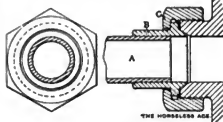


FIG. 2.

per are put together. White lead is a suitable material for water pipes and soap is used for gasoline pipes, although threaded joints are not much used in gasoline piping. There are some special compounds made for pipe joints.

Where the motor is located at one end of a car and some of the tanks at the other, the pipe connections are necessarily very long, and the pipes are liable to break from vibration, unless a section of flexible tubing is incorporated in them—either rubber hose or flexible metallic tubing. It should be remembered that rubber hose cannot be used successfully for conveying gasoline or oil, as these attack the rubber. Where the pipes are very long it is not wise to depend upon their rigidity for supporting them, but they should be supported on the vehicle frame at suitable intervals by hangers, which are provided with leather sleeves to prevent injuring the pipe.

Some judgment is necessary in inserting sections of rubber hose in a pipe line, especially when fluids are carried under pressure, or much trouble is likely to be experienced from the hose slipping off the ends of the pipe. Usually, in order to facilitate forcing the end of the pipe into the hose, it is ground to a taper; the hose is forced over this tapering part and onto the parallel part and is secured by a hose clip. This method, while it may be safe where the pipe line is straight and there is no tendency for the hose to move one way or the other, is hardly so where the hose is bent in a curve and connects two sections of pipe, making an angle with each other. In such a case the pressure in the pipe system has a tendency to force the hose off the ends of the pipes it connects. The ends of the pipes should therefore be provided with a groove or corrugations and the pipe firmly secured in these corrugations by clips or wire.

A temporary repair of a leak in a pipe may sometimes be made by taking a string, soaking it in oil and winding it around the pipe at the leak point in several layers, then tying the ends together. This method of repair will of course only answer where a liquid is carried. Another method consists

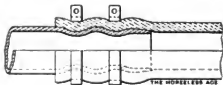


FIG. 3—HOSE CONNECTION.

of making a paste of litharge and glycerine, applying this to a linen or canvas rag which is laid around the leaky part, and then winding the whole with tire tape and string. The litharge paste is undoubtedly more effective than the oil.

Sometimes, in order to avoid injury to pipes connecting parts which may possibly slightly move with relation to each other, a loop is formed in the pipe. This, of course, adds slightly to the weight and to the resistance to the passage of the fluid through the pipe, but is a protection against breaking or twisting off the pipe.

FLEXIBLE JOINTS.

In some cars pipe connection has to be made between parts between which there is constant relative motion, as, for instance, parts mounted on the driving axle and the spring supported frame respectively. Flexible metallic tubing may serve in such a case, but it is more common, when steam is carried, to use so called flexible joints. These consist of a ball shaped enlargement at the end of one of the parts to be connected and a socket in two parts on the other part to be connected, to receive the ball.

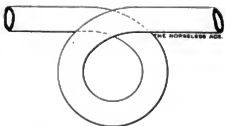


FIG. 4—LOOP IN PIPES.

per tubes are now generally used, which can be bent into different forms and require few joints. The two forms of joints used with this system of piping are the flanged joint and the union joint. The flanged joint is illustrated in Fig. 1. The tube A of copper or brass is grazed into the flange B, which is provided with a hub to allow of a long and securely brazed joint. The flange is then bolted to the part with which the pipe is to communicate, by two cap screws. A packing of brown paper or thin fibre is placed below the flange to make a tight joint. Fig. 2 shows a union pipe joint with conical ground seat. To the pipe or tube A is brazed a sleeve B with a flange and a conical face, this face fitting to a conical seat in a boss on the part to which connection is to be made. The outer surface of this boss is threaded to receive a nut C provided with an internal flange engaging with the external flange on the sleeve B and pressing the two conical surfaces into contact when the nut C is screwed in place. Where high pressures are carried, as in the feed water piping of a steam car, it is, however, customary to employ regular steam piping, with straight lengths of pipes and the common pipe fittings, elbows, nipples, tees, coupling, manifolds, etc. The threads of these fittings are tapering and the fittings must be screwed up hard to make a tight joint. In addition, some pipe joint material must be put on the thread before the threaded parts

White Metal Bearings.

White metal (babbitt) makes a splendid bearing for automobiles, and one which hardly ever requires adjusting, writes J. S. V. Bickford. The general objection to it is that if it does require adjusting you can't do it, but that is not the case in the majority of bearings. All you have to do is to wrap the bearing in asbestos twine, rubbed with lamp clay, and warm it up till the metal runs, when you have a bearing as good as new. This joint is used in the Pratt & Whitney lathe head stocks, and is presumably intended to outlast the lathe, as setting the headstock of an accurate lathe is a good bit beyond the power of the average lathe user. White metal would be an ideal metal for the bearings of a change speed gear box. It is not at all easy to bore these bearings quite true, but white metal simply must go true. Then, again, it can never stick on its shaft. It simply scores a bit and then forms a new surface, leaving the shaft undamaged.

To Bend Copper Tubes.

For bending a copper pipe a coil of steel wire just fitting the interior of the pipe is a better filling than sand or rosin, says the American Machinist.

LESSONS OF THE ROAD.



Troubles and Cost of Operating a Gasoline Machine.

By E. S. G.

Long before and ever since I have owned an automobile I have been a careful reader of THE HORSELESS AGE, and aside from the real interest and pleasure in reading it I have saved many times its cost from the valuable hints published in regard to the use and care of cars. I have been particularly interested in the various articles by users giving their experience. I have owned for nearly two years a single cylinder gasoline machine weighing about 1,500 pounds, and as I have used it without favor for both business and pleasure, it occurred to me that my experience regarding cost of operation, troubles, etc., might be of interest to some of your readers. I have enough mechanical knowledge to realize that any machine (even my wife's sewing machine) needs reasonable care and attention to perform its work properly.

I learned to operate my machine without instruction, and by taking the early morning hours (5 to 6), when the streets were free from traffic, I soon learned, without accident of any kind. My average running distance in good weather is about 500 miles per month, or 6,000 miles per year, which is about as much as the average business man will ordinarily accomplish. Most of this mileage was made up of daily trips of 15 to 50 miles, with occasionally an out of town trip of 180 miles or more. For a long period in the summer of 1902 daily trips of 34 miles were made, in which it was necessary to cross no less than forty-two double railroad and trolley car tracks. This was especially hard on the tires and springs of my machine.

Now as to gasoline automobile troubles. With a good carriage they should be very few for the first 2,000 or 3,000 miles. After that, when parts begin to wear and are not properly adjusted or replaced, the real trouble will begin. I have noticed that some users give their experience after the first 1,000 miles running. It is impossible for anyone to form an idea of what troubles to expect after such a short use as this, as almost any good machine will run the first 1,000 miles without a stop if supplied with oil and gasoline; it is only after parts begin to wear out and have to be replaced that one can form an idea as to what trouble to expect, and also the cost of repairs. Good care is what most machines need, and if they receive it constantly there is no more need of stopping on the road than if one were provided with a good horse, wagon and harness.

A quick daily inspection of the automobile before starting out, and a more careful periodical inspection, say once in three weeks, will usually prevent any serious trouble on the road. This inspection is sure to reveal lots of things that can be fixed in a moment and save endless annoyance on the road. In nearly two years' use I have had only two serious breakdowns, one in the differential and the other in the transmission. These were due to faulty construction, and I have the melancholy satisfaction of knowing that in the new model of this machine these particular parts have been greatly improved and strengthened.

In estimating the cost of operating I have tried to give a fair and not too conservative estimate of everything coming under the head of operating expenses, and have credited the account with the actual amount saved in railroad fares, including only those trips which were necessary in the course of business, and which would have been taken by railroad or surface cars if I had been without an automobile. These expenses, as per following table, cover a period of six months and a distance of 3,000 miles in all kinds of weather and over all kinds of roads. Average number of persons carried, three:

Interest on first cost.....	\$25.00
Depreciation	25.00
Gasoline	38.00
Oil	3.50
Batteries	5.00
Tires and repairs (single tube)....	40.00
Machine repairs.....	30.00
Interest and depreciation (on cost of stable, \$80).....	4.00
Chain	7.00
	\$177.50
Cr. By railroad and car fares.....	34.00
Total cost 3,000 miles in six months	\$143.50
Cost per mile.....	4.78
Cost per passenger for an average of three passengers.....	1.57

This is less than railroad fare, which is certainly remarkable when one considers the condition of the streets and roads and the weight of the machine.

In estimating the item of depreciation it is assumed that the carriage will last twenty years, and I see no reason why it will not do so with good care. [This item is evidently taken too low, as many owners are glad to sell their machines after a year's use at less than 75 per cent. of their cost.—Ed.] There is no doubt in the writer's mind that this gasoline automobile is practical and economical for the business man. In some future article the writer hopes to show how this same machine is also speedier than the railroad for trips from the centre of a large city to points in the country near a railroad, say from 75 to 200 miles distant.

The Automobile in Winter.

By DR. GEO. P. JESSUP.

There are several problems that present themselves to anyone who intends to use a gasoline car during the winter months, and as my cars have been on the road nearly every day for the past four years some of the provisions which I have made for their use during cold weather may be of interest. We do not get much extreme weather here. The thermometer seldom falls below 10° above zero, but we have three months of pretty steady freezing.

STORAGE IN COLD WEATHER.

An air cooled motor can be stored in a cold stable, but even with such a motor a cold garage is a good deal of a hardship. Handling cold machinery is anything but agreeable, and the machine is pretty certain not to receive proper care if kept in the cold. Your lubricants will freeze, bearings will run hard, and starting an engine that can scarcely be turned over on a cold morning is no fun. With a water cooled engine you must either use a non-freezing solution or keep the wagon in a warm place.

My auto room is 20 feet square, with a hot air furnace in a brick alcove. This furnace heats the room nicely, and also heats quarters for my man on the next floor. The furnace is so arranged that I can turn the heat either up or down stairs at will, and as it is situated in a brick alcove and presents no hot surfaces, I do not consider it a source of danger. The arrangement was heartily approved by the insurance inspector.

The floor of the garage is of cement, and sawdust is kept under the wagons to catch grease and water which otherwise make the floor very slippery and unsafe. There is a pit at one side of the room which at times is a great convenience. This is built of brick and Portland cement, with a 6 inch guard around the top and steps to get down into the pit. There is always a little sawdust at the bottom to keep it dry. The guard or wall is of brick and cement, and prevents the wagon getting into the pit when carelessly moved, and also keeps floor sweepings out of it.

At the other side of the room is the "wash," which drains into a cesspool outside. At one side of the room, under a window, is a substantial bench, with heavy iron vise and an assortment of tools—hammers, wrenches, files, drills, back saws, punches, chisels, tin irons, calipers, rules, etc. Just beyond the bench are several shelves filled with boxes of bolts, nuts, nails and odds and ends of various sorts. Under another window is a small lathe, and near the furnace is an old anvil.

The room is lighted by electricity, and I have two lamps on long cables that can be used in and about the wagon in any part of the stable. This room is rather larger and more elaborate than is really necessary. It is part (half) of my old carriage room. If, however, an automobile

is to be kept in constant use, a light, warm and roomy garage is a great comfort, if not a necessity.

CARE OF CAR IN COLD WEATHER.

The car wants special care in cold weather. Remember that an accident on the road in winter is very uncomfortable and annoying, and you should therefore be especially careful of loose bolts, etc. Also remember that in cold weather iron and steel are much more brittle than in warm weather, and that castings and springs must be watched, and sudden jars and shocks be avoided as much as possible.

I use much the same lubricants in cold as in hot weather. My wagon starts from a warm room, and on the road soon gets warm enough to keep the oil moving. To prevent the freezing of my circulating water I use a solution of calcium chloride. There has been a great deal of misunderstanding about this solution. I have never been able to dissolve 5 pounds of calcium chloride in a gallon of rain water, and lately have been trying a few experiments to determine the necessary density and specific gravity of the solution.

I find that in our ordinary hydrant water, which is pretty hard, I can dissolve 3.6 pounds of calcium chloride, and that this solution has a specific gravity of 1.190. I find that this solution, diluted with three parts of water, gives a solution representing less than 1 pound of calcium chloride to the gallon and having a specific gravity of 1.055, will not freeze at 11° above zero (the coldest weather we have had so far this winter), while a solution of six-tenths of a pound to the gallon (specific gravity 1.040) freezes at a point somewhere between 24° and 14° above zero. From this I conclude that a solution of 1 pound to the gallon, or of a specific gravity above 1.055, is safe in this climate, and shall test my solution from time to time with a hydrometer to satisfy myself that it is of sufficient strength.

I shall start with a saturated solution, as the solution loses strength rapidly from leaks and stopping.

The solution I used last season showed less than one-half pound calcium chloride to the gallon when removed from the wagon. I keep my solution and filter it, and add sufficient calcium chloride to produce a saturated solution for my next winter's work. My calcium chloride I get through my druggist. It costs about to cents a pound at wholesale. I have never noticed any injurious effects upon water jacket, pipes or tanks from its use, but get rid of it as early in the spring as possible. It makes things a little sticky and seems to boil rather more easily than plain water.*

*This conclusion is certainly erroneous, for all salt solutions have a higher boiling point than water. A curve of boiling points of calcium chloride solutions published in THE HORSELESS AGE of February 12, 1902, shows that for a solution of 1.055 specific gravity the boiling point is only a few degrees above 212.—Ed.

TIRES IN COLD WEATHER.

It seems to be the general impression that cold weather and frozen roads are specially hard on pneumatic tires. I have found my tire bills only about half as large in winter as in summer. I account for this on these grounds: (1) Small nails and tacks are more apt to be frozen fast and are thus avoided; (2) horses are less apt to drop horseshoe nails; (3) my tires are much firmer and harder to puncture in cold than in warm weather.

ARRANGEMENT OF CAR IN COLD WEATHER.

I have made a few changes in my runabout, which I find a comfort in cold weather. The small lever controlling the gasoline valve, which formerly protruded near the middle of the seat, I moved to the extreme right, where I can see it and get at it easily. I found it nearly inaccessible in its old position, when the driver was encumbered by a long overcoat and heavy rug. I have fitted a light movable panel, about 8 inches high, between the seat and the dash, on the right side of the wagon. This holds the rug in place on the driver's side where it cannot be tucked around the feet, which are busy with the driving levers. It also keeps the draught from flowing across the wagon over one's feet.

I always take a man with me in cold weather, if possible, as accidents and delays at such a time are specially annoying. In snow and mud two can often get a wagon through when one would absolutely fail. I also make it a practice on very cold days, if there is a long wait in a specially cold place, to have the engine started every fifteen minutes, as in this way a delay is sometimes avoided when you are ready to get off.

Up to last spring I used two cars of early make. Afterward I bought a light runabout, and hope before long to have some very interesting figures, comparing the expense and comfort of this rig with those of a few years ago. It has covered about 5,000 miles, and has already saved me about one-half of its initial cost. Some of its parts are unnecessarily inaccessible, and there are many details in its construction with which I am constantly finding fault; but it represents a wonderful advance toward the practical, everyday automobile—a vehicle for business as well as pleasure, and for those in moderate circumstances, as well as the very wealthy.

Cleanings from a Year's Experience With a Steam Machine.

By JAMES L. JENKS.

In November, 1902, I purchased a steam runabout, of the chainless type, and having the engine enclosed in a dustproof copper casing. I have run it several thousand miles, over some of the worst roads in New England, including a trip to the White Mountains, and it has never failed to do all that could be asked of it. With it I can climb any hill that a horse can

climb; I can, on a good road, make from 15 to 30 miles an hour, and keep it up, and for a few miles at a time I can get as high as 30 miles an hour if desired. It is noiseless, light and easy running, and will go from 10 to 13 miles per gallon of gasoline, depending on the roads. Never but twice have I been compelled to ask for aid; and neither time was the machine at fault. Once it was caused by running short of gasoline, and the other time was when one rainy night, in the darkness of the Crawford Notch in the White Mountains, I met with a slight mishap from running off the road, which led me to think I had injured the machine, but which, as I subsequently learned, had not impaired its running power at all.

THE ENGINE AS A PRESSURE GAUGE.

I have used my machine in all kinds of weather. One day last winter I went with my wife on a trip of 10 or 12 miles from home, with the thermometer down to 16° above zero. I froze my steam gauge solid, so that when we started on our return I could not tell how much steam I had. This, however, was no inconvenience, as one very soon learns from the feeling of the throttle and the responsiveness of the engine about what steam pressure he has. When I got home I found my steam gauge would not return to zero, but remained stubbornly at about 125 pounds. Being of an investigating turn of mind, I took the gauge apart, and after a little tinkering had it working as well as ever.

MUCH DEPENDS ON THE OWNER.

I have read in the columns of THE HORSELESS AGE many accounts of apparently unsuccessful steam machines, but a year's experience has taught me that more depends on the owner than on the machine. I do not mean by this that there are no defective steam machines, but I do mean that there are many owners who are always meeting with "accidents." Something is always "happening" to their machines, and as a result a large part of the time the machine is in the repair shop. During the year I have run my machine it has not cost me, all told, with the exception of tires, over \$25 for repairs, and I do not think that my machine was any better than any other turned out by the same makers.

The whole secret of keeping your machine out of the machine shop is to give it painstaking and intelligent care. An automobile is a somewhat complex and delicate piece of mechanism and extremely sensitive to neglect or abuse.

TIMIDITY A CAUSE OF FAILURE.

One of the first and most important factors in successfully handling an automobile is not to be afraid of it. The instant you begin to get a little timid in handling it that instant you cease to be its master, and it has begun to master you. I know one or two men who have owned steam carriages of the same make as my own. A want of care or knowledge about starting

their burner on one or two occasions gave them a fright from which they never recovered. As a result, they were always timid when starting, and also when running, and as a further result in their hands the machine was not a pronounced success.

If you find you cannot get rid of a feeling of timidity about your machine, you would better sell it, for it will always give you trouble, and things will happen because you are always expecting them to happen.

I alluded to a mishap which befell my machine in the Crawford Notch, N. H. I was at the time making the tour with two friends, each of whom had his own machine of the same make as my own. That night, as we sat around the dinner table at the Crawford House, the talk was all on my mishap, and both of my companions declared with great emphasis that they did not propose to return by automobile. "What do you propose to do then?" I asked them. "Ship the machines home by freight and go home ourselves by train," they replied. "Well," said I, "I am the only man who has met with any mishap on this trip, and I propose to go back on my machine. Why should the Notch Hill frighten you? Many men have climbed it before we did, and many more will come after us, and we can climb it or descend it as well as any other man. Moreover," I continued, "how long do you think you could stand the reviling your friends at home will be only too glad to pour upon you, for starting on an automobile tour and coming home on the cars?" The trouble was that they were a little frightened of the hill, but a little reasoning convinced them that a much better way was to just tackle some more of the same kind of hills until familiarity with such things bred contempt for them. As a consequence there were no autos shipped home, but we all returned by our own machines, as we should.

Suppose my friends had yielded to their fears and come home by train; do you suppose they would have ever attempted a White Mountain tour again by automobile? Probably not; and now, having faced the difficulties all the way through, they are both enthusiastic over the trip and contemplate a repetition of it next season.

INSPECTION AND LUBRICATION.

A second element of success with automobiles is frequent and thorough inspection and lubrication. When on tour I never think of starting without trying every accessible bolt, nut and joint on the whole machine. It takes very few minutes to do this, but the neglect of it leads to inevitable trouble. I have frequently found nuts loose that looked all right, but the wrench revealed their condition when nothing else would.

Nearly all working parts on my machine have compensation for wear, and this requires constant oversight. The minute a

joint begins to work too loosely, the wear should be at once taken up. It takes but an instant to do it, and a loose joint means a rattling machine, and invites fracture and disaster.

All stuffing boxes require daily attention en route, and should be kept snug without being too tight.

Frequent and thorough lubrication is one of the most vital factors to successful auto touring.

When I first got my machine I bought heavy cylinder oil for the cylinders and the best machine oil I could get for the running parts of the engine. Since then I have learned wisdom. I found after a time that every working part of the engine became quite warm, and almost hot, by being encased with the cylinders, as high pressure steam, superheated into the bargain, is pretty hot stuff. In consequence, the best machine oil I could buy ran off the engine like so much water. I then began to use heavy cylinder oil in my oil cups; this was a great improvement, but still not wholly satisfactory. I then came across a Dixon graphite production called "Graphitoleo," a mixture of graphite and vaseline. This was better than the cylinder oil, but still this melted off the hot surfaces too rapidly, so I began to experiment on a mixture, and at last struck one that has proved wholly satisfactory and miles ahead of either of the means I have mentioned.

LUBRICANT FOR PARTS RUNNING AT HIGH TEMPERATURE.

My compound is: Albany grease (summer grade), one part; graphite, fine powder, one part, and heavy cylinder oil, one part.

Melt together and while liquid pour into a plunger oiling syringe (one with curved nozzle is best). In ordinary summer temperature this can be forced out by the plunger into any crevice or bearing of the engine, and it will stay where you put it, and will not melt so as to run off. Should the mixture seem too stiff to push out of the syringe increase the proportion of oil, or, what is better still, warm the syringe a little either over the boiler or with the torch when lighting up, or it may be plunged into hot water bodily.

This mixture should prove as useful for a gasoline machine as for a steam machine, especially where there is any heat about the moving part.

This is a cheap mixture, far superior to any oil, and its frequent and thorough use will not only keep friction at a minimum but will prolong the life of the engine and greatly increase the pleasure of riding by decreasing the noise of the machinery. It is a very enjoyable thing to skim along a fine road, at 12 or 15 miles an hour, and hear nothing but the slight sharp clicking of the valves.

As to how often this mixture should be applied—when on tour I apply it every time I fill my water tank, which is about every 20 or 25 miles.

MAKING ENGINE MORE ACCESSIBLE.

One of the first things I did after getting my machine was to take it to a coppersmith and have four large slides cut in the engine casing, two on each side, and of a size sufficient to enable me to reach every part of the contained engines and gears. This saves an immense amount of time and labor, as it is not necessary to take off the copper casing, except at intervals for a more thorough inspection, or to pack a stuffing box.

To recapitulate then what my experience has taught me as essential to the proper use of a steam automobile:

1. Thorough familiarity with and mastery of the machine.
2. Frequent and careful inspection, wrench in hand, of every bolt, nut, joint and adjustable part of the mechanism.
3. Frequent and thorough lubrication with a lubricant that will stick to the surface of the metal to which it is applied.

If these rules are carefully followed your machine will be often on the road and less frequently in the repair shop.

Calendar of Automobile Dates and Events.

January 16 to 23—Madison Square Garden Automobile Show.

January 21 and 22—Annual Meeting and Banquet of the N. A. A. M.

January 23 to February 4—Brussels Show.
January 25 to February 6—Meet of the Florida East Coast Automobile Association.

January 25 to 30—Philadelphia Automobile Show.

February 6 to 13—Chicago Automobile Show.

February 12 to 24—Crystal Palace Show, London.

February 15 to 20—Detroit Automobile Show.

March 6 to 12—Buffalo Automobile and Sportman Show.

March 14 to 19—Boston Automobile Show.

March 19 to 26—Agricultural Hall Show, London.

March 21 to 26—Washington Automobile Show.

News notes from the United States in the French automobile journals are usually considerably at variance with the facts. The following example is from *La France Automobile*: "On November 28 a hill climbing contest was held at Eagle Rock (State of Orange) in rainy weather which rendered the course very heavy." *L. F. A.* should know that the State of Orange does not exist any longer, having been benevolently assimilated, and is now known as the Orange River Colony. Besides, news from there should be placed under South African notes instead of American notes. The rainy weather and heavy roads obtained at last year's Eagle Rock Hill contest, while this year both weather and roads were excellent.

Governing Gas and Gasoline Engines.

A paper read before the Automobile Club of Great Britain and Ireland on Thursday, October 22, 1903, by Dugald Clerk.

The governing of a steam engine is a very simple matter compared to the governing of an internal combustion engine of any type. With steam it is only necessary either to throttle the steam supply to the cylinder or to arrange a variable cut off gear admitting steam at full pressure, and cutting off at a variable part of the stroke.

DAIMLER GOVERNING.

When Daimler first produced his small gasoline engine, he governed by missing impulses. This, of course, was the natural thing for him to do, as he had been engaged for many years with Dr. Otto, at the Deutz Works, near Cologne, in building "Otto" cycle gas engines. It was difficult for him to govern by cutting off the liquid fuel supply in the way that a gas engine cuts off the gas supply. As he had used an automatic admission valve to the engine cylinder, he therefore governed by means of the exhaust valve. He applied the governor to the exhaust valve spindle in such a manner that, when the speed rose the governor pulled out the knife edge, opening the exhaust valve, and left the exhaust valve closed. In this way the piston of the engine simply compressed the gases within the cylinder, and compression and expansion went on alternately without opening the automatic inlet valve at all, and the pressure in the cylinder never fell below atmosphere until the exhaust valve was again opening by the fall in speed of the motor, and the consequent operation of the governor.

MODERN GOVERNING METHODS.

This method of operation proved unsatisfactory, but it was the method of governing which was almost universal until about two years ago. The charge throttle method of governing was introduced a little before that time, and now it may be said to be almost universal. This method of governing has the great advantage of maintaining the full frequency of impulses, and graduating the power of the impulses within

practically any required limits. Another method of controlling the impulse now in use consists in varying the moment of beginning the ignition. As a governing method this is an extremely bad one. If an engine be controlled by advance and retard sparking, the consumption of fuel remains practically constant for all loads, and no economy is obtained by running at light loads; and, further, the exhaust valve and exhaust pipe are liable to serious overheating.

The governing and controlling by varying the spark, and by reducing the total charge, are methods which I wish to discuss somewhat fully; but in order to discuss these matters intelligently, it is necessary to have some idea of the indicator diagram which is given by the gasoline engine. To obtain an accurate diagram from a steam or gas engine is, at all times, a matter of considerable difficulty; but in the case of the high speed gasoline engine the difficulties become very great indeed. So great are the difficulties that as yet it cannot be said that we have obtained any really accurate indicator diagrams from high speed gasoline engines. The diagrams got, however, from both large and small gas engines running at moderate speed are fairly accurate, and they assist us to understand exactly what is going on in the gasoline engine cylinder.

From Fig. 1 it will be seen that the pressure of compression is 160 pounds above atmosphere; the maximum pressure of the explosion is 465 pounds above atmosphere, and the mean available pressure throughout the stroke is 91.5 pounds. In this diagram it will be observed that the rise of pressure is very easy, and the indicator shows scarcely any oscillation at all. The various lines on the diagram thus represent with very considerable accuracy the changes of pressure which are occurring in the engine cylinder. I have calculated the maximum temperature of the explosion, and find that it is just over 1,800° Cent. The temperature of the exhaust gases after the stroke is complete, before the exhaust valve is opened, is just over 1,200° Cent. The heat thus disappearing by expanding the ignited gases doing work on the piston and loss by cooling through the cylinder walls is, altogether, some 600°.

In Fig. 2 diagram *a* is the ordinary full load: Compression, 100 pounds; maximum pressure of explosion, 420 pounds. Here

the piston, in taking in the charge, moves through the whole stroke while the inlet valve is held open. This valve is only closed when the crank passes the out centre and is about to return. In the diagram *b* the supply of charge is cut off at an earlier point in the suction stroke, so that the cylinder receives a smaller charge; consequently, when the charge is compressed, the pressure only rises to 82 pounds per square inch instead of to 100 pounds, and the explosion pressure rises to 298 pounds only instead of 420 pounds. In this way the mean pressure driving the piston is reduced, and the weight of mixture introduced into the engine to produce the less mean pressure is regulated. The other diagrams, *c*, *d* and *e*, show the action of reduced load upon the engine, with the result of less and less volume of charge admitted, so that at diagram *e* the compression pressure is only 25 pounds, and the maximum pressure is only 82 pounds. In this way the engine is regulated from full load to running quite light without load, and an impulse is obtained for each cycle.

The Westinghouse gas engine is also governed in a similar way.

ENGINE DIAGRAMS.

Before passing to the gasoline engine, it is desirable to notice some facts clearly shown by the gas engine diagrams. It will be observed that in all these diagrams, as the charge is reduced, not only does the explosion pressure become less, but the maximum pressure is attained later and later in the stroke. The reason of this is that, although the charge entering the cylinder is kept of constant explosive or combustible proportions, yet this volume is continually diminished. The exhaust products left in the compression space of the engine, however, remain constant in volume and very nearly constant in weight. Consequently, the diminishing weight of combustible charge is added to a constant weight of products of combustion, and thus, although the charge entering the cylinder is constant in proportions, the charge when mixed within the cylinder with the exhaust products becomes more and more dilute. In the Westinghouse, Crossley, Deutz, and Nurnberg engines, the last mixture entering the cylinder passes through a port of considerable dimensions; so that, although the cylinder itself and the combustion space are filled with somewhat dilute mixture, probably imperfectly mixed, yet the port itself always contains a fairly rich mixture.

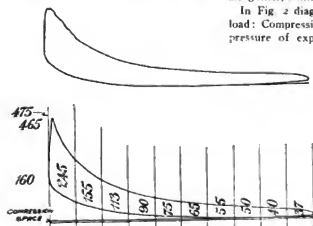


Fig. 1.—Indicator Cards taken from a large gas engine.

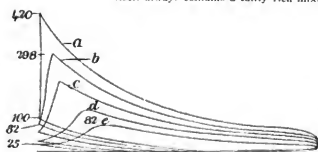


Fig. 2.—Cards taken from an engine governed by throttling.

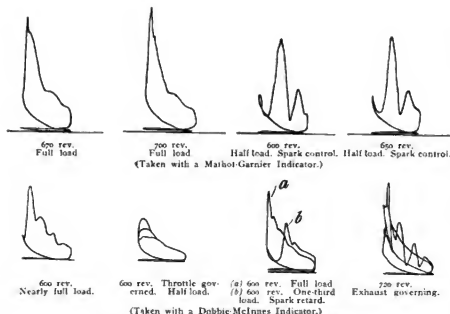


Fig. 3.—Indicator Diagrams of a $3\frac{1}{2} \times 4\frac{1}{4}$ Daimler Engine.

This renders the ignition certain when the hot tube is opened or the electric spark is passed. I may say that, in the really large gas engines of, say, 200 horse and upward, the electric spark produced by magneto machine is almost invariably used now for ignition. The effect of the dilute mixture is to cause the combustion to be slower and slower.

In gas engine governing it is obviously necessary, to insure accuracy of mechanical control, that for any given position of governor, or throttle, or cut-off lever, the impulse produced should be unvarying. Unfortunately, light load cards are liable to considerable variations; sometimes the pressure will rise more rapidly than at others, although the governor be apparently constant in position. This is due to the fact that a very small difference in the composition of the mixture will cause more or less rapid ignition, and thus give a heavier or lighter impulse independently of the action of the control lever or of the governor. This is a serious difficulty, which tells even more against accurate governing in gasoline engines than in gas engines. Variations of impulse occurring within the cylinder, due to variations in mixture and ignition, make it exceedingly difficult to prevent hunting. In a gasoline engine this difficulty can only be met by careful adjustment of carburetor, ignition, charge throttle, and governor. The carburetor introduces a complication in governing which, to some extent, is also found in gas engine governing. In gasoline engine control, the question of varying the time of ignition has also to be considered. I have accordingly tried to get diagrams from several gasoline engines running at speeds varying from 600 to 1,000 revolutions, and reproduce here diagrams obtained from three engines. First, a set taken from a Daimler engine of $3\frac{1}{2}$ inch diameter and $4\frac{1}{4}$ inch stroke. Fig. 3 shows a set of these cards. During the experiments, although the engine was a two cyl-

inder one, one cylinder only was kept in operation. The indicator used was one of the Mathot type, having an indicator cylinder of .352 inch diameter. The indicator drum was given a very short stroke. I do not consider the diagrams quite satisfactory, but they illustrate with fair clearness the actions proceeding in the cylinder during throttling and during retarding spark, and show that the throttling actions are very similar to those found with the Crossley and Westinghouse engines.

GAS ENGINE INDICATORS.

The diagrams, Fig. 4, were taken by means of the very ingenious and interesting Hospitalier-Carpentier manograph or indicator. This indicator is a most promising one, as it overcomes many of the troubles of high speed indications.* The combined horizontal and vertical displacement of a beam of light traces the diagram by means of a light ray on a ground glass surface. When the apparatus is stationary a round spot of light is seen on the ground glass. When the apparatus is in action, the spot of light travels so fast over the glass that an indicator diagram is shown as a bright line upon the ground glass plate. It is quite fascinating to watch the change of this diagram with the change in the control of the engine. To obtain permanent results a photographic plate is inserted in place of the ground glass, and ultimately 'the blue photographs which I hold in my hand are obtained from the photographic records.

AUTO ENGINE DIAGRAMS.

From these diagrams I find that in the Humber engine the pressure of compression at full load is about 125 pounds. Unfortunately the diagram is too short to show the maximum pressure; but as nearly as one can estimate, it appears to be over 400 pounds per square inch. An inspection of the expansion curve (a and b, Fig. 4)

shows a curious break in the falling line at the first part of the stroke. This is not due to any discontinuity in the expansion of the gases, but it is caused by a defect in the instrument, which I have no doubt can be remedied. The same defect is visible in a loop produced in the left hand corner of the diagrams d and e. Such a loop cannot possibly correspond to any conditions occurring in the cylinder of the engine in the state of the Humber engine when examined by me. At the time these full load diagrams were taken, the engine was giving as nearly as possible 28½ brake horse power, as measured by a rope brake on a special wheel, the rope brake being held by two spring balances—a heavy and a light one. Calculating the mean pressure required to account for the 28½ horse at 900 revolutions, four "Otto" cylinders, each $4\frac{1}{2}$ inch diameter and $5\frac{1}{4}$ inch stroke, I find that the mean pressure on the pistons—equivalent to the brake horse power alone, without allowing for friction at all—amounts to 734 pounds per square inch. Assuming the mechanical efficiency of the engine to be 80 per cent., which is an efficiency usual in large gas engines, the probable mean pressure in the cylinder is about 92 pounds per square inch. Diagram a, when calculated out, shows this exact mean pressure 92 pounds with a compression of 125 pounds. At half load, diagram b shows a mean pressure of 60 pounds with a compression pressure of 80 pounds. The explosion pressure here rises to 200 pounds above atmosphere. Diagram c shows the effect of throttling to quarter load, but here obviously the richness of the mixture has been disturbed by the mixing of the gases with the exhaust products, and also varying proportions of gasoline get into the cylinders.

EFFECT OF CONTROL ON DIAGRAM.*

The diagrams here show very considerable variation between the minimum and maximum. The lower diagram, for example, shows a mean pressure of 30.6 pounds, and the upper diagram a mean pressure of 33 pounds per square inch. Such a variation in the diagram only occurs when the mixture is just on the verge of missing ignition. It would be impossible to say what the effective mean pressure was in the cylinder at this time because of occasional missed ignitions and because of the difficulty in apportioning the proportion of low pressure to high pressure ignitions. This diagram illustrates very well the difficulty to which gasoline engines are specially liable when governing at light loads—that is, the instability of the diagram due to variation in mixture, which does occur even when the same volume of gasoline is admitted. The diagram d shows regulation of the power by retarding spark only. The compression in this diagram is 125 pounds, the same as in diagram a, but the mean pressure from the diagram is only 66 pounds. In this diagram, it is to be remembered, exactly the same amount of gasoline is being consumed in the engine as when at full load, and the maximum temperature is

* For description and illustration of this apparatus, see THE HORSELESS AGE of March 5, 1902.

not greatly different from that at full load. In these gasoline engines the maximum temperature of the explosion on such a diagram as a cannot be far short of 2,000° Cent. In the case of diagram a, as this temperature is attained at the beginning of the stroke, the hot flame is exposed during the whole travel of the piston to the cooling influence of the cylinder walls in addition to the cooling due to expansion doing work. It thus follows that the exhaust gases are well cooled down before the exhaust opens, and the pressure of the exhaust at the moment of opening is at its lowest. In diagram d the pressure of the exhaust is higher than in a, and the temperature also is higher, because the higher pressure is attained with a smaller weight of gases just

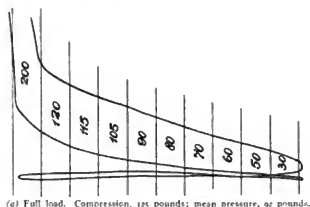
open at a light load for even ten minutes, controlling the speed only by retarding spark, the exhaust pipe rapidly rises to a good red heat; and the exhaust valves, although one cannot see them, must be also red hot. I have observed in some engines, which evidently had been run for long periods with retard sparking, that the metal forming the exhaust valve spindle guide has actually been melted away round the spindle. It is not surprising, therefore, to find that much difficulty is experienced with exhaust valves when engines are run long with retarded spark. The retard spark method of controlling an engine is a most mischievous one, and all gasoline engines should be designed so that the full range of controlling can be accomplished by throt-

pressure in the Wolsley cylinder as 90 pounds.

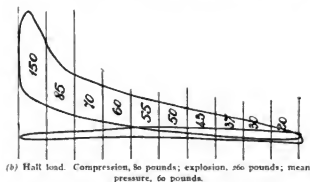
Mr. Dawson has been experimenting with a gasoline engine, four cycle, cylinder $3\frac{1}{2}$ inch diameter, 5 inch stroke, and he has kindly sent me an indicator diagram which he has obtained by means of a special indicator made by himself. This indicator diagram shows a compression of 80 pounds per square inch, and a mean available pressure of 92 pounds per square inch.

METHODS OF THROTTLING.

Although the method of throttling the total charge is the easiest of application in practice, and perhaps at present the most satisfactory method of governing, yet it seems to me there is another method of op-



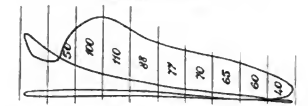
(a) Full load. Compression, 125 pounds; mean pressure, 92 pounds.



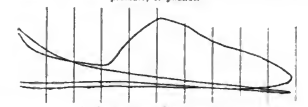
(b) Half load. Compression, 80 pounds; explosion, 260 pounds; mean pressure, 66 pounds.



(c) Quarter load. Compression, 70 pounds; mean pressure, 55.3 pounds and 30.6 pounds.



(d) Half load. Spark retarded. Compression, 125 pounds; mean pressure, 66 pounds.



(e) Quarter load. Spark retarded.

Fig. 4.—Diagrams taken by means of Hospitalier Manograph on a 4½x5¾ Humber Engine.

at the point of liberation to the exhaust. In a diagram the temperature of exhaust is probably a little less than about 1,400° Cent. This high exhaust temperature is further shown by diagram e, where the spark is retarded to reduce the engine to quarter load. Here it is obvious that the exhaust pressure is very much higher than in either a or d, and here the exit valves are in considerable danger of being damaged by the high temperature of the exhaust flame. In this particular diagram the temperature of the exhaust will approach something like 1,500° Cent.

SPARK RETARD CONTROL.

The evil of attempting to control for any length of time by retarding spark is readily seen in any four cylinder gasoline engine. If the engine be run with the throttle full

tling the charge. Variation in the timing of the spark should only be resorted to when it is desired to drop or raise the speed of the motor; and so it is necessary to retard the spark in order to avoid too early or late ignition. The engine should always run so as to give a diagram like a and b. Under these circumstances the exhaust gases, instead of being hotter at light loads, are much cooler, and the engine is much more gently treated. At the same time, of course, less gasoline is consumed.

I have taken a brake test from a 5 horse power Wolsley engine in my possession, and find, although I have not yet indicated it, the actual brake pull requires a mean pressure of 72 pounds per square inch in the cylinder. Assuming the efficiency to be 80 per cent, this requires an addition of 25 per cent, to 72 pounds, which gives the mean

eration which is superior to it in many theoretical and practical respects. The fall of compression required by the throttle method of governing results in an increase of gasoline consumption per indicated horse power obtained, and this would be avoided if the compression could be kept in constant by admitting the air charge during the whole inlet stroke of the engine, and varying the time of admission of the gasoline so as to come later and later in the stroke, as the engine became less and less loaded. Such a method of operation, however, introduces difficulties in maintaining constancy of proportion of gasoline to air, and it requires care in shaping the combustion chamber so as to make certain to have mixture of standard strength near the ignition point. For such governing, a somewhat long combustion space is required. In gov-

erning of this kind, too, very effective proportioning of gasoline to air is required, and a thoroughly effective mixing of the gasoline with the air, however small the volume of gasoline introduced. Governing of this kind, however, has the advantage that at light loads the mean temperature of the gases filling the cylinder is greatly reduced, and the economy of gasoline for equal power would be as good at light loads as at heavy loads. Governing of this kind has been proposed for large gas engines, and an attempt is at present being made to introduce the system, but so far as the other type of governing has proved more easy to handle.

EXHAUST THRITTLING.

A governing cycle of this type is that followed by the De Dion engine. In that engine the governing is performed by retaining a portion of the exhaust gases in the cylinder. A very neat arrangement is provided which closes the exhaust valve within limits at any determined part of the exhaust stroke, and so retains a portion of the exhaust gases in the cylinder. By this means the suction valve does not operate on the suction stroke until the exhaust gases compressed in the combustion space have again fallen to atmosphere. By this method the compression is kept up to a very considerable extent, and the volume of admitted charge varied. This control works very well and gives and maintains impulse every cycle under very light loads. It seems to me, however, to have several objections, in that the hot exhaust gases are mixed with the incoming cold charge, and the mixture compressed is very hot to begin with. This, of course, leads to loss of gasoline when running at light loads, as the added heat to produce a diagram area begins at a much higher temperature and therefore requires a larger heat loss.

Although the governing of the gasoline engine is now fairly satisfactory, yet there is still much room for improvement. At very light loads throttle governing is apt to be somewhat unstable, and impulse changes occur in the cylinder independently of the movement of the controlling or governing lever. To produce the best possible governing, the first thing required is certainty of the proportion of combustible mixture at all speeds and loads. This is a question, of course, of the carburetor. The second appears to be certainty of ignition within the cylinder, not only as to firing or not firing, but as to firing exactly at the same time, and attaining the same maximum temperature at an equal movement of the piston. This requires good mixing, and at light loads as little mixing as possible of the combustible charge with the exhaust products in the combustion space of the cylinder. In the event of varying the speed greatly, it also requires some accurate mode of retarding or advancing the spark to keep the diagram always rising to a maximum at the compression end of the stroke at all speeds. In most cases this is done at present by a somewhat haphazard hand oper-

ated arrangement. The best governing also seems to me to require constant compression and constant low temperature of the charge before compression. In addition to this, of course, to obtain a governor which does not hunt, the mechanism of the governor must be arranged for stability, and possibly some dashpot arrangement introduced to prevent the governor acting too quickly. I have confined myself, however, to the heat fluid part of the problem, and do not intend to enter at all into mechanical questions.

Commercial Steam Vehicles.

(Abstract from a lecture by Parker H. Kemble before the Boston Y. M. C. A. Auto School.)

The subject of the sixth and last of the lectures to be given on the application of steam to road locomotion deals with what may be called the commercial side of the problem.

Commercial traffic can be broadly divided into passenger, light freight, heavy freight and special service.

For light freight traffic the outlook is more encouraging than in passenger transportation, and there is a fighting chance for the light delivery car. It is not, however, until loads of 2 tons or over are reached that the motor car, and the steam motor car especially, comes into strong competition with the horse drawn vehicle. As soon as slow, heavy horses are required, and the loads begin to outgrow the draft power of a pair, the motor stands pre-eminent.

The speed of a team of truck horses walking varies from 2 to 3 miles per hour. The speed of a steam motor truck varies between 5 and 6, 5 being a fair average. This speed is independent of the temperature, as a motor is not subject to heat prostration.

As to the space occupied, the motor is far ahead. A 7 ton load, with four horses, will cover some 40 odd feet of length of the street, while a motor truck, 23 feet long, will handle that load comfortably. It can as well be worked much harder. The English dray horse averages but little more than three to three and one-half hours' actual work in the day. He pulls a heavy load, and pulls hard when at it, but the trips are short, and the periods of rest are frequent. The motor can keep going, and with greater speed will do almost three times the distance. In one case where comparative records were kept, a 4 ton steam truck easily did the work of two drays and four horses, besides being idle an average of one hour each trip awaiting its turn to unload.

The practical limit of weight carried in one load would seem to be about 14 tons; above that one or more trailers would be required, and a train of that description would be out of place in a city.

The special forms in which the commercial motor vehicle appears are numerous, and in this connection it is interesting to note that our country, usually so progres-

sive, is distinctly behind in the substitution of steam traction for that by horse power. Abroad fire engines, street sweepers, watering carts, mail wagons, trucks, dump carts, traction engines are more or less familiar features, traction engines being quite common on the interurban roads.

One of the first questions in approaching the question of freight transport by road truck is that of the fuel to be used. In other countries, notably England, they have been quietly developing boilers for burning coal, coke and crude oil. What is probably the most successful all around motor truck in England today burns coal or coke with perfect success. The production of both gasoline and kerosene is limited, and the rapidly increasing price is a warning of what may be expected should the demand greatly increase. Crude oil has many advantages as regards cost and convenience, but for commercial work, where clean hands are not essential and no feminine passengers are carried at the side of the driver, coal or coke offers the simplest and cheapest solution of the problem.

The tire problem is another vital problem in this connection.

In England they have adopted the steel tire of the horse truck, and depend entirely on the springs for the necessary relief from the shocks and jars of traffic. From a commercial point of view, until a new material, as resilient as rubber and as desirable as steel, is discovered the steel tire would seem to be the correct solution for heavy vehicles.

Among the objections urged against the adoption of the motor truck is that a skilled driver is required. The machinery may be laid out in the simplest form and the brains provided in the operator, or the layout may be completely automatic and the brains provided at the stable to care for the machine when at home. Less skilled labor is probably required in the former case, as the steam truck machinery in its simpler forms is no harder to run than the average pile driver or hoisting engine.

N. Y. S. A. A. Incorporated.

The New York State Automobile Association, with its principal office at Syracuse, was incorporated on December 28. The directors named are C. R. Page and O. A. Quayle, of the Albany Automobile Club; A. J. Baechle, of the Utica Automobile Club; F. H. Elliott and H. W. Smith, of the Syracuse Automobile Club; S. C. Tallman, of the Auburn Automobile Club; H. S. Woodworth, of the Rochester Automobile Club; W. E. Hotchkiss and A. H. Knell, of the Buffalo Automobile Club; A. R. Pardington, of the Long Island Automobile Club, and Emerson Brooks, of the A. C. A.

The new body is in effect the State Division of the American Automobile Association and will carry out the State program of the parent organization.

The 1903 Paris Salon.

By DR. LEON GUILLET.

The sixth annual Exposition of Automobiles, Cycles and Sporting Goods was opened on December 10 and closed on December 25. As in previous years, it was held in the Grand Palais, in the Champs-Élysées, which was constructed for the 1900 Universal Exposition. This building, which has a floor space of 20,000 square metres (roughly 220,000 square feet), was completely occupied by show stands. As is well known the exposition is of an international character; it comprised the following classes:

First class, automobiles, motor cycles and all kinds of mechanically propelled vehicles (only manufacturers and agents were allowed to exhibit in this class; a special class was moreover provided for heavy traction vehicles). Second class, cycles of all kinds. (The main hall is entirely reserved for exhibits in classes 1 and 2.) Third class, automobile commerce; fourth class, tires; Fifth class, chassis, mechanical parts and accessories for automobiles, cycles, etc. Sixth class, motors for automobiles and launches—accumulators. Seventh class, materials of construction—tool equipment for the manufacture of automobiles, cycles, etc. Eighth class, automobile bodies. Ninth class, motor navigation. Tenth class, aerial navigation. Eleventh class, applications of denatured alcohol. Twelfth class, touring and divers sports. Thirteenth class, clothing, etc., for automobilists, cyclists and tourists. Fourteenth class, inventions and novelties relating to automobilism, cycling and the sports. Fifteenth class, publications, journals, photographs, etc.

REVIEW OF EXHIBITS.

The firm of De Dion-Bouton exhibited the following types: The 6 horse power "Populaire" runabout for two passengers, with two speeds ahead and one reverse, which is already well known to the public; an 8 horse power runabout, which differs materially from the corresponding 1903 model, and to which we shall refer farther on; a 10 horse power two cylinder model with three speeds forward and one reverse, the experimental car of which type is at present making a tour round Europe; a 12 horse power two cylinder type with three speeds and reverse, and a 15 horse power two cylinder type, which is principally intended for trucks, delivery wagons, omnibuses, etc.

These different models have many common features. The clutches in all are of the well known De Dion type, comprising expanding segments inside of a clutch drum, the drums having the change gears secured to them. The rear wheel drive in all cases is by lateral Cardan shafts, with hollow rear wheel hubs. All the motors have automatic admission valves, splash lubrication and high tension ignition. The two cylinder vehicle is of the same type as described by the writer some time ago in



ONE OF THE TASTEFUL STANDS OF THE EXPOSITION.

an article on "Commercial Vehicles in France." A pump draws the oil from the bottom of the crank case and returns it to an oil reservoir at the side of the motor cylinders, from which it is fed to the bearings by gravity.

The 8 horse power single cylinder model differs considerably from the 1903 model. In the first place it is provided with a gear giving three forward speeds and one reverse. The clutch is still engaged by means of a lever directly below the steering wheel, but the slow speed is obtained by means of a pedal under the operator's right foot. A lever at the side of the seat gives the reverse speed. The running gear frame is tubular, and is reinforced, the main tubes of the frame being of 50 mm.

(2 inches) diameter. The tread of the vehicle is about 47 inches, and the wheel base 80 inches. The frame has been lengthened to accommodate a comfortable body. The radiator is of the sectional type (cloisonnée).

At this stand was also shown a two cylinder motor in section, one-half of it having been cut away. At another stand the De Dion-Bouton Company exhibited a number of delivery wagons, omnibuses and trucks, which have already been described in THE HORSELESS AGE.

Panhard & Levassor had a very large stand on the main aisle, and one of the most important exhibits at this stand was a superb 35 horse power mail coach belonging to Prince Orloff. This car



THE GARDNER-SCHULTZ CAR BUILT FOR THE SHAH OF PERSIA.

was surrounded by a large number of 24 horse power four cylinder chasses and automobiles, and by a smart landaulet with two cylinders, for city work. There is nothing of importance from a mechanical standpoint to be reported in connection with this exhibit, except, perhaps, that this important firm still clings to the armored wood frame, which it has been using for ten years. The Krebs carburetor figured conspicuously at this stand. Finally it is to be noted that the larger motors of this firm are now fitted with mechanically operated inlet valves, and that in all motors the cylinders are now entirely separate, twin cylinders being no longer employed.

The Mors firm exhibited some novelties which created a considerable stir. Among these was a new carburetor which automatically maintains the proportions of the mixture constant and insures very regular running of the motor. The governor of the motor has been very much simplified, and the vehicles are now equipped with a device by which the speed of the motor is reduced when the clutch is thrown out.

The Daimler Motoren Gesellschaft, of Cannstatt, exhibited a large number of vehicles of 28 and 40 horse power. The stand also comprised a 60 horse power chassis, to which particular interest attaches. This chassis has a wheel base of 124 inches, and is designed to receive a very large "family" body. These various vehicles are characterized by mechanically operated inlet valves (operated by change motion levers), by a carburetor suspended very close to the inlet valves, by the four low tension spark plugs, and by separate connections from the magneto to the different spark plugs, which admit of easily localizing the fault in case one of the cylinders should miss fire. The gear box is of very compact design, and is placed under

the dashboard. The clutch is of the expansion type, instead of being conical. The most interesting point in the latest Mercedes types is undoubtedly the very general use of ball bearings. The adoption of these bearings insures a considerably greater efficiency, and with the transmission gear mounted on such bearings a gain of as much as 10 per cent. is possible in the power at the road wheels. There are many manufacturers who attribute the success of the Mercedes cars in the Gordon Bennett race to the use of these bearings in the 90 horse power model.

The Delahaye firm during the last two years have built only vertical motors, yet they showed an 8 horse power vehicle equipped with a horizontal motor, claiming that the horizontal motor is superior from the standpoint of flexibility, efficiency and freedom from vibration. There were also to be found on this stand three models with vertical motors, as follows: A 12 horse power, two cylinder, 100x140; a 16 horse power, four cylinder 88x110, and a 24 horse power, four cylinder, 100x140. All these motors have automatic admission valves. A point worth noting is that the clutch cone is fitted with a detachable leather lining held in place by steel rods passing through sockets. The leather lining may be removed without taking the clutch cone from the vehicle. In the latest Delahaye cars the transmission is still by chains and gears. All the frames are of pressed steel without false frames.

The Maison Clement exhibited a very recent type of vehicle under the name 1904 Clement-Bayard. Owing to arrangements with the Clement-Gladator, the Maison Clement has no longer the right to sell the old style Clement cars. The Clement-Bayard vehicle is built in three sizes, as

follows: A 7 horse power, two cylinder, four passenger vehicle, the two cylinders being of 80 mm. bore by 100 mm. stroke, entirely separate from each other and fitted with mechanical inlet valves; a 10 horse power, two cylinder (90x120) car with magneto ignition, direct drive on the fourth gear, and a pressed steel frame; and a 16 or 24 horse power four cylinder car with independent cylinders, ignition by magneto, a centrifugal governor acting on the admission, and a four speed and reverse gear. The gear changes are effected by means of cams, and the sliding gears are mounted on ball bearings. These last named vehicles have a 56 inch tread and 100 inch wheel base.

Owing to want of space we can only briefly refer to exhibits found at the other stands, some of which comprise very interesting novelties.

The Rossell vehicle is fitted with a two cylinder motor of the Daimler type, with magneto ignition. The friction clutch consists of a leather lined cone. The frame is of the pressed steel variety, and the speed gear is of the classical sliding type, securing direct drive on the high gear.

The Moto-block car has a frame of armored wood and a twin cylinder motor which runs at 1,000 revolutions per minute. The motor and change gear (the latter giving three forward speeds and a reverse) are built together in a single case and run in an oil bath. Within this case is also disposed the ignition and exhaust operating mechanism. The motor is arranged in an inclined position which facilitates access to its working parts. The object in view in this design is said to be the greatest possible saving of power in the transmission gear and the most substantial construction.

Rochet-Schneider exhibited two principal types of cars, both with four cylinder motors, one of 16 and the other 24 horse power. The 16 horse power car has a wheel base of 104 inches and a tread of 52 inches. The chassis weighs 1,430 pounds and is 32 inches wide. The 24 horse power type has a wheel base of 112 inches and a tread of 56 inches; the weight of the chassis is 1,650 pounds and the chassis is 34 inches wide. The frames are of soft pressed steel; the motor comprises two twin cylinders, with inlet valves and low tension ignition devices on one side, and the exhaust valves on the opposite side. The change gear box contains two sets of sliding pinions, and the drive is direct on the high gear. The sliding pinions are operated by means of two forked levers, one for each set of pinions. The change gear is connected to the clutch by means of a universal joint.

Mention should also be made of the large trucks and omnibuses exhibit by Turgan & Foy, De Dietrich, Serpollet, Prosper Lambert, Tony Huber, Minerva, etc.

If we resume the conclusions which are arrived at after an examination of the different stands, we find that no sensational



NEW MOTOR FIRE ENGINE OF THE PARIS FIRE DEPARTMENT

improvements likely to revolutionize the automobile industry were shown. The steam motor was less in evidence than at former expositions, being represented only at a single stand, that of Gardner-Serpollet. Electric vehicles were shown in considerable number, but no conspicuous improvement in this line was apparent, the majority of the vehicles carrying still about 1,200 pounds of battery which enables them to make a trip of something over 40 miles on one charge. Some real progress seemed to have been made in the line of combination vehicles. The principle on which these vehicles are based is as follows: An explosion motor is used to drive an electric generator, which in turn operates one or several motors which are geared or chain connected to the driving wheels. Vehicles of this type were exhibited at the Salon by a number of important firms, including the Krieger firm. M. Jeantaud, on the other hand, exhibited a vehicle based on an entirely new principle. The system comprises two concentric dynamos which may be operated either as generators or motors at the option of the driver, and a great number of speed and power gradations are possible.

Passing now to the details of motor car construction, it was found that few changes had been made in the mechanical part. Motors of one, two and four cylinders are still all being employed, but there is a marked tendency toward four cylinders; on the other hand, the three cylinder motor, which is better balanced than the four cylinder, and not as expensive as the four cylinder, has increased in popularity. The eight cylinder car, which created some stir last year, has not entered into practice. One car with a six cylinder motor was on exhibition, but it may be said that it has little more chance of success than the preceding type.

There has been considerable progress in the line of carburetors. The widely advertised Krebs carburetor has suggested a number of modifications. On the whole, numerous improvements have been made, having in general for their object to overcome the influence of changes in the density and humidity of the atmosphere and of the motor speed upon the carburation. The use of alcohol as a motor fuel has not made any progress, its high cost and great consumption rendering it inferior to gasoline as a motor fuel until great improvements shall have been effected in its production, or the taxes which are collected on it shall have been taken off.

Attention should also be called to a new application of the explosion motor, as embodied in a motor propelled fire engine constructed for the city of Paris which was exhibited at the show. The engine is capable of a maximum speed of 15 miles per hour, and the pump has a capacity of 1,800 litres (400 gallons) per minute. In still weather the engine will throw a column of water 40 metres (about 130 feet) high. Directly opposite this fire engine (which was built



THE MARTINI CAR, WHICH SOME TIME AGO ASCENDED THE COG RAILWAY AT CAUX—SHOWN ON A SECTION OF THIS RAILWAY.

from designs by Lieutenant-Colonel Vulquin, of the Paris Fire Brigade) was shown the much heralded motor road train invented by Colonel Renard, well known for his experiments with steerable balloons. A few details of this train may be of interest, and we reproduce some extracts from a report recently made to the French Academy of Science. The invention is designed to accomplish the following two objects: First, to connect the motor mechanically (not electrically) to the wheels of all the vehicles, in order to make use of the adhesion of all the wheels, which permits of driving a long, heavily loaded train with a comparatively light tractor; second, to arrange the connection between the vehicles in such a manner that when the leading vehicle describes a curve, all the other vehicles automatically turn in the same curve, without attention of the operator, the same as if their course was guided by rails.

The system comprises a locomotive, which constitutes the first vehicle of the train, and carries the motor and the steering and braking mechanism, and any suitable number of trailer vehicles. It will be seen that this system differs completely from all previous ones in that the locomotive is not a tractor, as it does not draw the trailer vehicles, the power being applied directly to the wheels of the latter. This train was generally regarded as the feature of the show presenting the greatest popular interest, as the "clou" of the exposition.

In conclusion, this exposition, although it is completely devoid of sensational novelties, is nevertheless a very notable event, on account of the very considerable progress in numerous details it has brought forth.

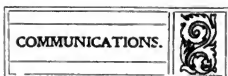
Some Facts and Figures About the Paris Show.

The show was open to the public every day from 10 a. m. till 6 p. m. The admission charged was 1 franc per ticket, except on Fridays and special days; on Friday the admission was 3 francs a person, and on special days 5 francs. Exhibitors were allowed free of charge from one to four exhibitors' tickets and from one to four attendants' tickets, according to space occupied.

The show space was divided up into stands not exceeding 80 square metres of surface. The charge made for the space was 25 francs per square metre (46 cents per square foot) in all parts of the main hall, which was reserved for exhibits in classes 1 and 2, and double this, or 50 francs per square metre along the main aisle.

The show was organized by a committee comprising members of the Automobile Club of France, the Cycle and Automobile Trades Association, the Automobile Trade Association and the Syndicate of Cycle Manufacturers. The net profits of the show will be divided as follows between these various organizations: Automobile Club of France, 65 per cent.; Cycle and Automobile Trades Association, 13 per cent.; Automobile Trade Association, 13 per cent.; Syndicate of Cycle Manufacturers, 7 per cent.

The floor space was divided among the different classes by the organizing committee, and the space assigned to each class was then divided among the exhibitors in that particular class by lot. The show was controlled by a very comprehensive set of regulations.



Comparative Speed of Auto and Railroad Freight Service.

Editor HORSELESS AGE:

During the recent Endurance Contest from New York to Pittsburg the point was made that automobiles kept running even when trains were held up by adverse weather conditions. A number of instances have come to our attention of late showing that even under ordinary weather conditions the automobile is quicker and more dependable than the railroads. The most recent instance is that of a shipment of an automobile made by us on Monday morning to New York via railroad. This was delivered to the consignee in New York city Thursday forenoon. Tuesday forenoon of the same week we started a similar automobile under its own power for Philadelphia, which city it reached Wednesday afternoon, having made several calls on the way, during which considerable business was transacted.

In view of repeated instances of this sort we find it cheaper and quicker to ship automobiles under their own power to points within a reasonable distance, even during winter weather.

KNOX AUTOMOBILE COMPANY,
E. H. Cirtler, President.

Superheating Query.

Editor HORSELESS AGE:

I have been writing your journal for some time and desiring information in regard to a superheater on a steamer have decided to write you. I have a 16 inch fire tube boiler, with a kerosene burner, which keeps everything red hot. I could not put a pipe through the boiler, but could run it down and up the side of the boiler, and have about 3 feet over the fire. I could arrange this pipe so that the steam would not enter it until after it has passed the throttle, which I judge from what I have read on the subject is the best way.

As this 3 feet of pipe over the fire would get red hot, am I right in thinking that this arrangement would give me drier steam, greater mileage, with water capacity, and a less visible exhaust?

AN AMATEUR.

[The superheating coil offers all the advantages which you expect. According to some correspondence in our columns about a year ago, as much as 20 per cent. gain in mileage on one charge of water has been secured. An accompanying disadvantage is that the engine will require more lubricating oil. Some care is advisable in firing up not to get the superheating coil too hot before steam is allowed to pass through it. The arrangement you mention, of passing the steam pipe from

the throttle valve down the outside of the boiler, through the combustion space (in a single turn or loop about 2 or 3 inches from the wall of the burner case) and up again, is the one usually employed on Locomotive type steam carriages.—Ed.]

Practicability of the Dos-a-Dos.

Editor HORSELESS AGE:

There is a large class of automobilists who want the comfort and protection of a top on their runabouts, and also be able to take their families for a spin without the necessity of too troublesome changes. The detachable tonneau looks incongruous with a top, is heavy to handle and catches the dust. The folding seat in front of the dash is convenient, but has obvious objections.

The dos-a-dos can be made a comfortable seat, is easy to put on and off, can be used without removing the top and catches less dust than the tonneau.

Will those who have had experience with the dos-a-dos kindly give, through the columns of THE HORSELESS AGE, their deductions regarding its practicability and their reasons for and against its use?

INQUIRER.

Information on Tire Repairs Desired.

Editor HORSELESS AGE:

I think I voice the sentiment of all experienced autoists that tires and their expense constitute the largest part of our troubles. No matter how carefully we run or how well we watch the rough and bad places in the roads, punctures, cuts and leaks will occur, and often leaks will occur without a puncture. What we desire in automobile journals—which are most generally taken by those owning automobiles or prospective buyers who will own one—is practical points on the repair of leaky and injured tires, both on the road and in the stable, as well as how to properly take care of tires, the same as of the motor. With our limited knowledge of tires and their troubles, we are at a great disadvantage and are at the mercy of tire manufacturers, who usually require several weeks to repair a damaged tire and return it, and if one is not fortunate enough to own an extra one his machine is simply out of business until the tire is returned from the factory. The formulas of good, harmless injecting compounds to stop leaks are much desired, as well as many other practical repair pointers, both for single and double tube tires, which will be thankfully received by all autoists.

T. B. GULLIFFER.

[The reason that not much on this subject has appeared in THE HORSELESS AGE is that all the tire manufacturers publish instruction booklets, which, we believe, can be had for the asking. These booklets explain, generally by the aid of illustrations, how to make repairs, take the tires off and replace them, etc. To remove a heavy tire is, nevertheless, a difficult job whether

one has a thorough theoretical knowledge of how it is done or not. We shall soon have something on this subject on the "Beginners Page."—Ed.]

Motor Delivery in Providence.

The Shepard Company, of Providence, R. I., proprietors of a very extensive department store, have been using for the past month three Knox delivery wagons of the latest type. These wagons have been used in connection with the grocery department of the firm, but they have been in use for so short a time that no definite conclusions regarding their performance can be obtained. The vehicles have operated very satisfactorily as far as their mechanism is concerned, but have naturally experienced some tire trouble and some slight difficulty in negotiating snowy streets. The Shepard Company express themselves as in favor of the new motive power in case reliability and increased speed can be obtained by its employment, even though the cost may exceed the use of the horse, and they are looking forward to conditions under which the whole delivery business of the firm can be conducted by mechanical traction.

Trade Literature Received.

Richard J. Flinn, West Roxbury, Mass.—"The Flinn Steam Trap."
Woolley Foundry and Machine Works, Anderson, Ind.—"Burger Gas Engines."
Pope Motor Car Company, Toledo, Ohio.—Catalogue of the new Pope-Toledo.

H. S. Powell, Clinton, N. Y.—Circular of the Powell Carburetor.
Evening Institute of the Boston Y. M. C. A.—Announcement of the auto school gasoline courses.

Atwood Manufacturing Company, Amesbury, Mass.—Catalogue of automobile lamps.

The Hartford Rubber Works Company, Hartford, Conn.—"The New Dunlop Detachable Tire."

A. H. Funke, 325 Broadway, New York—"The New Safety Storage System of Acetylene Lighting."

Tennant Auto Tire Company, Springfield, Ohio.—Catalogue of the Tennant "puncture proof" tire.

The Packard Motor Car Company, of Detroit, Mich.—Advance catalogue of the Packard 1904 voiture légère.

The Burt Manufacturing Company, Akron, Ohio.—Catalogue of the Cross oil filter.

Timken Roller Bearing Axle Company, Canton, Ohio.—Catalogue No. 6 of the Timken roller bearing axles.

The Matthews Boat Company, Bascom, Ohio.—Catalogue of Matthews Motor Launches.

NEW VEHICLES AND PARTS.

The Desberon 1904 Touring Car.

The Desberon Motor Car Company, New York city, are getting out a new touring car of 30 horse power, which they will build in addition to their 1903 light cars, of 12½ and 20 horse power respectively, with 1904 improvements.

The frame of the 30 horse power car is constructed of flat steel strips bolted to wooden sills (armored wood construction), with steel brackets underneath, which bolt up through the body, serving the double purpose of stiffening the frame and fastening the body. Semi-elliptic springs are used, of generous length—30 inches in front and 40 inches in the rear—insuring easy riding. The front and rear axles are heavy steel tubing with forged steel stubs, steering pivots and cranks. The wheels are wood artillery type, 32 inches in diameter, with 3½ inch detachable tires, plain bearings and brass caps, which act as oil retainers. The stub ends are hardened and ground, while the wheels are bronze bushed.

The engine is a four cylinder, four cycle, vertical one, of 4½ inches bore and 6 inches stroke, placed in front under a bonnet or hood. The cylinders are of cast iron, cast separately, with separate water jacketed heads that slip down over the air cooled cylinders, making an absolutely tight joint which requires no packing. The intake and exhaust valve box and head are cast in one piece, and the water jacket surrounds

the exhaust valve seat. Accessible automatic intake valves are located above the exhaust valves, so that by removing the intake valves the exhaust valves is exposed to view. Both valves have steel stems and cast iron heads with the usual forty-five degree seat. The crank shaft and connecting rods are forged of steel. The engine base or crank case is cast of a special

aluminum alloy, and all its bearings are fitted with adjustable phosphor bronze bushings.

The carburetor used is shown in Fig. 2. The gasoline from the tank enters at B, flows through the needle valve C (regulated by float D), up into the spray nozzle E, from which it issues under the suction of the inrushing air, which enters through

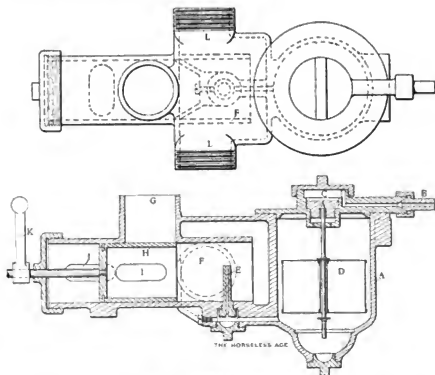


FIG. 2—DESBERON CARBURETOR.

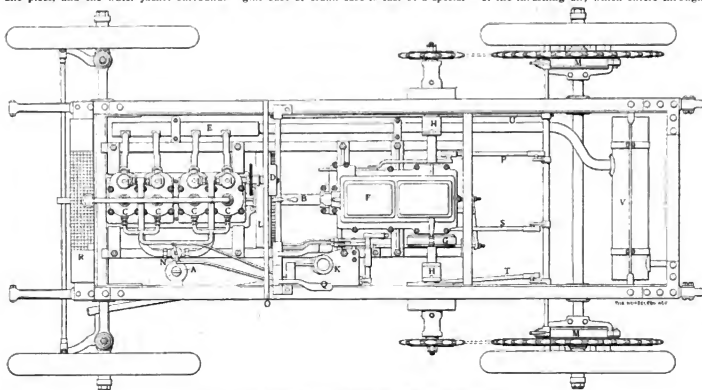


FIG. 1—PLAN OF DESBERON THIRTY HORSE POWER CHASSIS.

A, float chamber of carburetor; N, spray chamber of carburetor; CCCC, engine cylinders; I III I, inlet valves; R, radiator; D, commutator; L, fly-wheel; B, emergency brake; J, clutch pedal; Q, brake pedal; K, steering column; F, transmission gear case; H, universal coupling blocks; G, differential brake; T, connecting rod from gear shifting lever to countershaft; S, connecting rod from countershaft to reversing gears; P, connecting rod from countershaft to reversing pinion; U, connecting rod from countershaft to emergency brake; V, muffler.

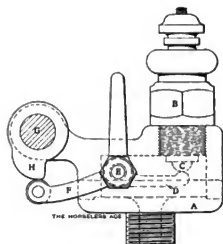


FIG. 3—IGNITER PLUG.

either of the openings L.L. The mixture, after being formed in the vicinity of the spraying nozzle, passes through the chamber F and up the outlet G, and from there to the cylinders. The plunger H, controlled by the governor, acts as a throttle on the gas as it passes into the outlet G. When the plunger is in the position shown the gas is entirely cut off. The plunger H is formed with an oblong slot I in its side wall, which can be made to register with the oblong slot J in the wall of the chamber F, to regulate the auxiliary supply of air. The plunger H is provided with a lever K, which latter is connected to a lever on the dash of the vehicle. For throttling purposes the plunger is worked back and forth, and for regulating the mixture the plunger is given a rotary movement to bring the two slots into register. The gasoline supply is carried in a 12 gallon tank under the front seat.

The ignition outfit is somewhat out of the ordinary, provision being made to produce four separate sparks in each cylinder

at the same time. Each cylinder is fitted with three separate jump spark plugs and one make and break spark. The latter is of somewhat novel construction, and is illustrated in Fig. 3 herewith. The spark chamber R secured into the cylinder head, carries a shaft G driven from the cam gear and having fastened upon it the cam H. The rocker arms F and G are formed integral with the shaft E, and a spring on the upright arm holds arm F against cam H. As rock arm F rises on cam H it brings rocker arm G in contact with spark plug B at C, thereby completing the circuit for the electric current. When rocker arm F drops off cam H rocker arm D breaks contact with point C, thereby opening the electric circuit and causing an electric flash. If only the make and break spark is desired any metal plug will answer for B. The commutator is attached to the dashboard and is driven by chain from the engine cam shaft.

For cooling the engine water is carried in a 12 gallon tank located at the rear of the chassis. A honeycomb radiator is provided in front, together with a fan driven by belt from the crank shaft. The water is circulated by a centrifugal pump driven off the flywheel by friction.

All bearings of the motor are oiled by means of a mechanical lubricator located on the dash inside the hood. This lubricator has a capacity of three quarts of oil.

The driving clutch is of the conical variety, and is leather faced and provided with engaging springs under the leather. The transmission gear case is cast of aluminum alloy; it contains the sliding change gear, giving three forward speeds and one reverse; the bevel gears and the differential all running in an oil bath. The bevel gear drives the countershaft, carrying at its ends the sprocket pinions, from which the power is transmitted to the rear wheels by chains in the usual manner.

One or the other of two systems of shifting the transmission gears will be employed, at the option of the customer. One comprises a hand lever arranged on the steering post under the steering wheel; the other side shifting levers, as shown in Fig. 4. The shifting lever J operates the connecting rod K, which shifts the gears through a countershaft. Brake lever L works on the saw toothed sector M bolted to a bracket fastened by bolts to the frame sill R and longitudinal angle B. The lever L operates the emergency brakes on the rear wheels, while the differential band brake is operated by pedal F, which also at the same time disengages the clutch. The clutch is separately disengaged by another foot pedal. When the shifting lever is located on the steering column, the emergency brake lever is placed in the centre of the car, as shown in the plan view of the chassis (at B).

The inclined column wheel steering of the worm and sector type is employed, as shown in Fig. 2, in which F is the steering post, G a worm upon which a nut is carried which is movably connected to a bell crank, giving arm H a backward and forward movement, this arm being connected to the steering knuckles by the connecting rod L.

The wheel base of the car is 78 inches. The body will be of the King of the Belgians type, with heavy roll upholstery, individual seats in front, and with an extra folding seat on the door of the tonneau.

A New Dunlop Rim.

A new rim for Dunlop detachable tires has been brought out, as shown by the accompanying sketch.



NEW DUNLOP RIM.

accompanying sketch. The rim consists of a hollow ring flattened at the point of contact with the wood felloe of the wheel, slightly concaved at the tire seat to form a cup in which the inner tube will round out naturally under pressure, and also concaved at each edge to receive tubular elliptical side flanges, which are rendered removable by means of the turnbuckle provided with right and left threads.

Panhard's Sued.

The Association of Licensed Automobile Manufacturers have brought suit for infringement of the Selden patent against Panhard et Levassor, of Paris, and their New York representative, A. Massehat. The particular object in bringing suit against a foreign manufacturer is said to be to protect those importers of foreign cars who have taken license under the Selden patent.

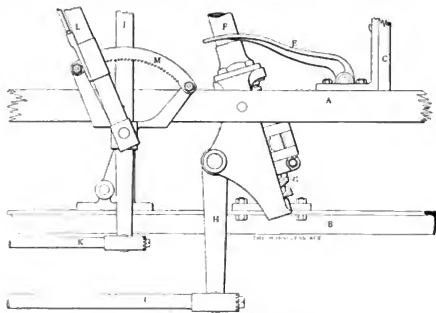


FIG. 4—OPERATING MECHANISM.

OUR FOREIGN EXCHANGES.



The Spyker Gasoline Car.

An exhibit was made at the Paris Show by the Dutch firm of Spyker Brothers, who stage two very remarkable cars. The first to come under our notice was the 16 horse power four cylinder Spyker, the engine casting of which takes a somewhat remarkable and unusual form, being circular in shape, with embossed plates bolted to each end. The four cylinders and valve boxes are formed in this circular hollow casting, this method being adopted to simplify the water jacket coring and to get an ample body of water round the valve chambers. The exhaust valves are set on one side and the induction valves on the other, both being mechanically actuated. Two cylinders are cast in one circular envelope, the two castings being flanged on their abutting faces and bolted together. The engine is carried on a bed plate, which forms part of, and is stamped out with, the steel frame, and has four large and well placed inspection plates to the crank chamber.

The water jacket contains about 1½ gallons of water, and this is, of course, connected up with radiator and pump in the usual way. The gear box is carried on stamped extensions of the frame in a similar manner to the motor, the sliding sleeve of the change speed gear being actuated by a fixed rod and rack moved by a toothed sector within the box. The other salient remarkable feature of the stand is the six cylinder Spyker, in which all four wheels are driven. The rear pair are rotated through a clutch, gear, propeller shaft and bevel gear, but the gear is provided with an extra gear shaft, from which a propeller shaft, suitably articulated, runs forward to the steering axle—which is a live axle in this case—and this is fitted with a differential gear and bevel wheel exactly as in the case of its rearward fellow. The steering axle, therefore, drives the steering wheels through ball joints, which permit of them being deflected for the purposes of direction.—*Autocar*.

Trouble Cars Taxable.

An inland revenue case which came before the magistrates at Blackburn, England, recently, is of considerable interest to the owners of cars employed only for tending other vehicles. The Liverpool Road Carrying Company was summoned for using an unlicensed motor car. Their defense was that as the car in question was only used to tend vehicles that had broken down, and, being thus merely employed for burden purposes, was exempt from duty. The mayor of Blackburn decided that such a car should pay duty, but we think the point worth appealing on, as an authoritative ruling would be worth hav-

ing. In any case manufacturers of cars must remember that if any particular car is ever used for pleasure purposes it becomes dutiable.—*Auto-Motor Journal*.

English Trials Awards to American Cars.

The judges of the last British Reliability Trials have just made their report, from which it is learned that both prizes in Class A—cars selling at £200 or less—a gold and a silver medal, were won by Oldsmobiles. A special silver medal was awarded to a 10 horse power White steam car for its small water consumption.

The A. C. F. has awarded a prize of 5,000 francs to Gabriel for his victory in the Paris-Bordeaux race last summer.

The A. C. F. on Saturday, November 28, gave a fête at its clubhouse in honor of the delegates of the British Parliament in Paris and at the same time inaugurated the new addition to its clubhouse, at 8 Place de la Concorde.

The Automobile Club of Nice, France, is said to have passed a resolution requesting the city administration to have the dust removed from the tarred streets. "Is this irony or is it an acknowledgment of failure?" asks a French contemporary.

Madame Clouet, who successfully rode a Georgia Knap motor bicycle in the 1,000 kilometre trials recently held in France, has issued a challenge to race anybody over a distance of 25 kilometres on a motor bicycle with a maximum cylinder capacity motor of a one-quarter litre.

The manufacturers of commercial automobile vehicles in France are forming a *Chambre Syndicale des Transport Automobiles*. M. Turgan, of Turgan & Foy, is president, and M. Rondet-Saint, connected with the makers of the Hagen gasoline wagons, vice president.

The *Gil Blas* states that the sixteen motor cars ordered by the Empress of China from a German firm are on their way to China. A number of Chinese engineers have been learning to drive them. Should any mishap occur to the Emperor and Empress while out in the cars the drivers say they will pay the penalty with their lives.

The city of Milan, Italy, wishes to mark in a worthy fashion the completion of the Simplon Tunnel, and has accordingly arranged for the holding of an international exhibition devoted specially to methods of transport by land, water, or air, but there will also be galleries devoted to general manufactures and also to the decorative arts. Full particulars can be obtained on

application to the secretary of the executive committee, Piazza Paolo Ferrari, 4, Milan.

The Automobile Club of France, on the initiative of the Marquis de Dion, has decided to organize a commercial vehicle competition during 1904.

One characteristic of the recent Paris Show was the comparative absence of large racing freaks. There were very few cars shown over 35 horse power.

A convention of automobile event organizers was held at Paris on December 17, in the automobile show building, to fix the dates of auto events for the coming year and prevent interferences.

A conference was held on December 15, at the A. C. F., upon the initiative of Prince de Arenberg and M. Franchomme, as delegates for the French provincial clubs, chiefly with the object of defining the limits of the zones of influence of each provincial club.

The London County Council on December 7 began registering London motor cars and licensing their drivers. There was a great rush on the part of those who desired to register and to obtain licenses. Three hundred applications by letter had been received before the council was officially in readiness to receive them.

Charles Jarrott will drive a French car in the Gordon Bennett Eliminating Races and perhaps also in the actual Gordon Bennett race. When questioned about it by a compatriot he said: "Well, I did my best for England and failed. I nearly broke my neck, and I think that's quite enough. I have got myself to look after now, and as the English cars don't seem to be able to take a first place in these racing contests, why I have agreed to race for the French club."

The new English law requiring motorists to register with the county councils does not specify that this must be done in the home county of the candidate for registration. In consequence the A. C. G. B. and I. has circularized a number of county councils, pointing out that it is the desire of many automobilists that their fees of 20s. per car shall be paid to those counties which are most anxious to adapt their roads and their administration to modern requirements. The intention, of course, is to arrange that counties hostile to automobilism shall receive as little as possible of the money accruing from automobile registration. Presently we will see some enterprising coast resort hotel keeper offer licenses free of charge, after the example of Milwaukee hotel keepers with regard to marriage licenses.



The Induction Coil Company, Milwaukee, Wis., have enlarged their plant.

The Ford Motor Car Company will open a Chicago office about January 1.

The Charles Kaestner Manufacturing Company has located at South Bend, Ind.

The Union Automobile Company will be moved from Union City, Ind., to Anderson.

The New York Garage Company will erect a garage on West Forty-first street, near Broadway.

The Crocker Cycle Company, Falmouth, Mass., have opened a modern garage and automobile machine shop.

It is reported that an automobile factory will be built at Allegan, Mich., by James R. McGill, of Chicago.

The Broadway Garage, New York, have opened a station at 413 West 150th street, Washington Heights.

It is reported that the automobilists of Portland, Ore. will build an automobile course up Mt. Hood.

The Waterloo Motor Works at Waterloo, Ia., were recently damaged by fire to the extent of \$25,000.

A meeting of the creditors of the Searchmont Automobile Company was held on December 28.

Mack Brothers Company, of Brooklyn, N. Y., are building several more Manhattan gasoline buses carrying from ten to thirty persons.

We have received from Basil H. Joy, technical secretary of the A. C. G. B. and I., the rules of the Slide Slip Competition, 1904.

The Cincinnati Cab Company, Cincinnati, Ohio, will establish a cab service connecting with the various railroad depots.

The Bates & Edmonds Motor Company, Lansing, Mich., will manufacture a touring car designed by M. F. Bates, of the company.

Raymond S. White, a New York lawyer, who was injured by his automobile turning over at Bay Shore, L. I., died on December 21.

W. F. Meserve, who has built several successful steam and gasoline trucks, has removed his shop from Canobie Lake, N. H., to West Derry, N. H.

The N. W. Whitten Cycle Company, 484 Broad street, Providence, R. I., has adopted the name The Motor Vehicle Company and will handle unlicensed cars.

Charles J. Glidden lectured on his 13,000 mile European automobile tour before the Boston Y. M. C. A. Auto School on

Tuesday evening, December 22, illustrating his lecture with 155 lantern slides.

The Utah Automobile Company, Salt Lake City, Utah, have increased their capital from \$10,000 to \$25,000. Le Roy C. Snow has been elected president.

I. J. Rice, of Beulah, Col., writes us stating that he has invented a steam engine which he believes will be far ahead of any other motor for automobile use.

At Nashville, Tenn., the speed of automobiles has been limited to 10 miles. Each owner or driver is required to pay \$3 per year for a license to operate in the city.

The Arlington Company, 475 Broadway, New York city, are putting on the market transparent celluloid sheets, which are being substituted for glass on touring automobiles.

W. D. Gash, formerly sales manager of the Searchmont Automobile Company, has taken entire charge of the automobile business of John Wanamaker in New York and Philadelphia.

The Boston Automobile Dealers' Association, Boston, Mass., have decided that it will not be for the best interests of the association to join the Automobile Association of America.

The Grand Rapids Automobile Company and the Richmond-Jarvis-Caro Company, Grand Rapids, Mich., have been consolidated under the latter name, with a capital of \$50,000.

President W. H. Moore, of the National Good Roads Association, is trying to secure the old fair grounds at St. Louis, Mo., for the international automobile races next spring.

The recent rules and regulations of the park commissioners of Boston, Mass., permit automobiles to run in Middlesex Falls, Revere Beach, Mystic Valley, Fresh Pond and Blue Hill parkways.

At Washington, D. C., H. C. Porter, of the Porter Battery Company, Chicago, claims to have run a carriage equipped with a Porter battery 121 miles on one charge in ten hours and thirty-two minutes.

The Frisbie Motor Carriage Company, Columbus, Ohio, will open a large garage January 1 at 753 and 755 East Long street, Columbus, Ohio. The agency for the Santos-Dumont car has been secured.

Owing to the failure of the Brooklyn Rapid Transit Company to come to an agreement as to arrangements for a trolley across the Williamsburg Bridge, the residents of Williamsburg are advocating the establishment of an auto stage service.

Three of the five Napier cars in the Gordon Bennett Eliminating Race in England will be driven by John Hargreaves, Mark Mayhew and S. F. Edge, respectively. The other two drivers have not yet been appointed.

Woolsten & Brew, expert mechanical and electrical engineers, have opened a large, three story garage at 152 West Fifty-sixth street, New York. They have secured the agency of the Thomas and

Stevens-Duryear cars, and will carry a full line of parts and supplies.

Many automobile manufacturers attended the sale of the assets of the Shelby Motor Car Company, Shelby, Ohio. The greater portion of the machinery was bought by T. B. Jeffery & Co., of Kenosha, Wis., to be shipped to their factory.

The Indiana Automobile Company, Indianapolis, Ind., has purchased the property formerly owned by the Cadillac Company of Indiana, at 307 and 313 Massachusetts avenue, Indianapolis, and will erect a new building which will be used as a salesroom.

The Motor Vehicle and Truck Company, of Columbus, Ohio, were to furnish large gasoline engine trucks for freight transportation across the bridge at St. Louis, Mo., have gone out of business. It is claimed the bridge commissioners have refused to grant permits.

The new building of the Pacific Motor Car Company, San Francisco, Cal., has been completed, and F. R. Dorman, late of the American Motor Carriage Company, has been engaged as manager of the garage department and George Sooner as manager of the machine shops.

Henry Wick, of Youngstown, Ohio, has sold to Walter Flynn property on Wick street, Youngstown, Ohio, including an automobile factory. Mr. Flynn intends to organize a company to manufacture runabouts and touring cars and to run a large garage and charging station.

The Peerless Motor Car Company inform us that they entered a machine for the Gordon Bennett Race in the name of L. H. Kittredge, their treasurer and general manager, who is a member of the A. C. A. An entirely new machine will be built. The driver has not yet been determined.

The Kirk Manufacturing Company, Toledo, Ohio, will not put their new four cylinder car on the market this season, but will confine themselves to their present model, increasing the horse power to 16 and making the bodies in two types, stanhope and tonneau. Their 1905 car will be rated at 30 horse power.

The affairs of the Chicago Motor Vehicle Company, Chicago, Ill., now in the hands of a receiver, are further complicated by a suit for an injunction brought by Ida M. Felt, a stockholder, who charges incompetent management and seeks to prevent the proposed reorganization of the company. The officers deny the allegations.

By using the upper tier of boxes in Madison Square Garden, accommodation has been found for fifteen new exhibitors, raising the total number to 170. The Mack Brothers Company, Brooklyn, will show a 15 passenger gasoline car, and the Coldwell Lawn Mower Company, Newburgh, a gasoline propelled lawn mower and roller.

The Locomobile Company of America report the following recent sales of their

gasoline touring cars: H. M. Brittin, New York City; P. F. H. Eisemeyer, New Haven, Conn.; Frank F. Holt, Staunton, Va.; Edward S. Warren, Bridgeport, Conn.; Dr. Stuart McGuire, Richmond, Va.; M. Victor Vallade, Paris, France; John W. Thompson, Yokohama, Japan; W. J. Kingsland, New York City; B. C. Wheeler, Shanghai, China, and George Henning, Auckland, New Zealand.

The New York branch of the Winton Motor Carriage Company has been removed to new quarters at 1706 to 1718 Broadway.

As a measure of protection against hold-ups, which have lately been frequent in the suburbs of Philadelphia, wealthy residents have undertaken to patrol the roads in their automobiles at night.

Automobilists in Portland, Ore., are strenuously endeavoring to have a good road formed up Mount Hood. It is believed that by means of suitable gradients automobiles could be run up to the line of perpetual snow. If the proposition can be carried into effect it will make one of the most unique and interesting drives in the world. The scenic view which could be obtained from it would be magnificent, and it would serve to attract many to visit one of the finest districts on the Pacific Coast.

The following have been assigned space at the Buffalo Automobile Show, to be held March 7-12: Pierce, Thomas, Cadillac, Centaur, Packard, Franklin, Rambler, National Electric, Crestmobile, Stevens-Duryea, Duquesne, Locomobile, Ford, Toledo, Waverly Electric, Winton, Olds, Peerless, Apperson Brothers, White Steamer, Haynes-Apperson, National Battery Company, Northern, Autocar, O. K. Machine Company, Buffalo Gasoline Motor Company, Twentieth Century Lamp Company, Badger Brass Company, Ripper, Reliance, Santos-Dumont and St. Louis.

The Mobile Carriage Company, of San Francisco, which was incorporated over a year ago for carrying on an automobile passenger service, and some time ago purchased the interests of the Mobile Company of America on the Coast, has secured the California agencies for the Pierce Arrow touring car, Pierce Stanhope and the Northern runabout. It now has in course of construction one of the largest automobile garages in the country, having a frontage of 1 1/2 feet on Golden Gate avenue, 120 feet on Gough street and Jefferson square and 137 1/2 feet on Elm avenue. The building will be one story high, Grecian style of architecture, and will have a ladies' parlor and reception room with private lockers and gentlemen's clubroom and such other facilities as go with a modern garage. The automobile passenger service has been increased by adding a carload of Santos Dumont touring cars and Fredonias to a large number of steam cars already in use. The directors are J. Alfred Marsh, president; Livingston Jenks, Heber C. Tilden, Charles K. Harley and Major Charles L. Tilden.

New Incorporations.

The Sandusky Automobile Company, of Sandusky, Ohio, has been incorporated for \$150,000.

The Diamond Motor Company, New Haven, Conn., has been incorporated with \$750,000 capital.

The Imperial Auto Company, of Detroit, was incorporated on December 11, with a capital of \$50,000.

The Ridpath Motor Vehicle Company, of Berlin, Ontario, Canada, has been incorporated, with a capital of \$50,000.

Woolston & Brew, New York.—Capital, \$25,000. Incorporators, George F. Woolston, William P. Brew and J. T. Emery.

Auto Import Company, of New York.—Capital, \$50,000; directors, M. S. Hamburger, R. E. Dalrymple and H. M. Wise.

Tuxedo Automobile Station, New York city.—Capital, \$5,000. Incorporators, Stewart C. Craig, Julius Rohwaldt and John Westenberg.

Roebuck Automobile Company, Brooklyn, N. Y.—Capital, \$5,000. Directors, S. H. Roebuck, G. E. Roebuck and W. W. Payne.

Montana Automobile Company, Butte, Mont.—Capital, \$20,000. Incorporators, A. E. Hook, N. L. Olson and Charles F. Williamson.

The Lucy-Taylor Automobile Company, of Albany, N. Y., has been incorporated with a capital of \$15,000 to deal in automobiles.

The Independent Automobile Manufacturing Company has been incorporated at Sioux Falls, S. Dak., with a capital of \$100,000.

The Barhoff Motor Cycle Company has been incorporated at Hartford, Conn., by Fred W. Barhoff, Jessie W. Begsley and P. R. Day.

Auto Shop, Paterson, N. J.—To manufacture automobiles; capital, \$50,000; incorporators, Andrew T. Fletcher, F. Hand and W. J. Tynan.

Centaur Motor Company, Buffalo, N. Y.—Capital, \$100,000. Incorporators, Harry C. Wilcox, Jesse B. Eccleston and F. Worthington Butts.

Keystone Motor Car Company, 100 Market street, Camden, N. J.—Capital, \$12,500. Incorporators, E. H. Godshalk, C. A. Godshalk and John F. Joline.

The Crescent Automobile Company, Jersey City, has been incorporated with a capital of \$50,000 by T. F. Merseles, Louis J. Blakelee and Edith E. Downs.

Davis Robe Company, Chicago, Ill.—To manufacture automobile clothing. Capital, \$2,500. Incorporators, Matthew Mills, Fred J. Haacke and Sidney S. Gorham.

The Cushman Motor Company, Lincoln, Neb., has filed articles of incorporation, increasing its capital stock to \$300,000, of which \$50,000 is to be fully paid up.

Oscar Lear Automobile Company, Columbus, Ohio.—Oscar S. Lear, Mattie E. Lear, Lee A. Frayer, W. J. Miller and J. H. Deem, incorporators; capital, \$30,000.

Standard Automobile Company, of East Liberty, Pa.—Capital, \$75,000. Directors, W. N. Murray, Robert Pitcairn, Jr., Robert P. Jordan, F. C. Perkins and R. S. Robb.

Jennings Automobile and Manufacturing Company, Jersey City, N. J.—To manufacture automobiles; capital, \$500,000; incorporators, John J. Curtis, Jr., Russell Bonnell and E. W. Ward.

The Marion Motor Cycle Company, Indianapolis, Ind., has been incorporated for \$50,000, the directors being Frederick A. Joss, Charles A. Bookwalter, Robert A. Hassler, J. Arthur Hittle and J. G. Beker.

Auto Company, of Nashville, Tenn.—Capital, \$25,000; incorporators, W. F. Anderson, Frank G. Fite, Jordan Stokes, T. M. Steger and J. W. Hawley, of whom Mr. Steger has been elected president, Mr. Stokes vice president and Mr. Anderson general manager.

Arlington Heights Automobile Company, of Fort Worth and Arlington Heights, Tex.; to operate a line of automobiles from Fort Worth to Arlington Heights and other places; incorporators, A. T. Byers, C. S. Mattison, Wm. Bryce, M. R. Sanguinetti and Robert McCart; capital stock, \$3,500.

The Chisholm-Phillips Automobilium Company has been incorporated at Cleveland, Ohio, with a capital of \$50,000. Among those interested are Henry Chisholm, of the Champion Rivet Company, and Frank Phillips, of the Frank Phillips Carriage Company. The company broke ground this week for the erection of a show room and garage on Euclid avenue, opposite Olive street, to cost \$50,000, and 50x100 feet, three stories high. It will be ready for occupancy about March 15. The company have the agency in Northern Ohio for the Peerless car.

Club Notes.

TROY A. C.

The Troy Automobile Club has been admitted to the New York State Automobile Association.

The clubhouse of the club was destroyed by fire on December 22, and temporary quarters have been opened at 9 Hall Building.

A. C. OF CIRCLEVILLE.

The Auto Club of Circleville, Ohio, was organized on December 15 with twelve members. Dr. D. V. Courtright was elected chairman pro tem and Dr. G. W. Heffner secretary pro tem.

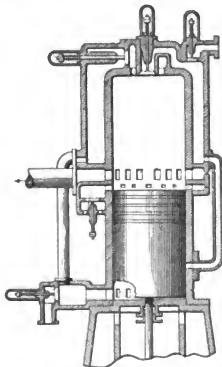
PHYSICIANS' A. C. OF NEW JERSEY.

The Physicians' Automobile Club of New Jersey, composed exclusively of medical men, has been organized at Newark with the following officers: President, Dr. Edward L. Burns; vice president, Dr. Wm. H. Bull; secretary, Dr. Clement Morris; treasurer, Dr. M. Z. Westervelt. The club will purchase automobile supplies in bulk and sell to its members at cost.



United States Patents.

744,881. Explosive Engine.—Heinrich Soehnlein, of Wiesbaden, Germany. November 24, 1903. Filed May 21, 1901.



No. 744,881.

The invention relates to a two cycle engine and provides means for preventing premature explosion of the combustible gases when coming in contact with the burning gases at the end of the power stroke. The piston divides the power cylinder into two chambers, the upper or explosive chamber and the lower or pump chamber. The explosion chamber jacket is also divided into two chambers, an air compression chamber (on the left) and a gas compression chamber (on the right). The explosion chamber is provided with four sets of port holes—a set of piston controlled exhaust ports and a set of piston controlled air ports at the end of the downward piston

stroke, and a set of air ports and a gas port in the cylinder head, both controlled by automatic valves. During the down stroke of the piston gas is compressed in the jacket chamber on the right and air in the jacket chamber on the left. The piston cuts off communication with the gas compression chamber before the end of the down stroke and compression of the gas then ceases. The communication with the air compression chamber remains open till the end of the down stroke, with the result that the air is compressed to a higher pressure than the gas. When the piston uncovers the air ports at the end of the downward stroke a certain amount of air is admitted into the combustion chamber. These ports are closed, however, after a very short period and then the automatic air valve in the cylinder head opens and admits additional air from the air chamber. Shortly after the gas valve opens—the gas pressure being less than the air pressure—and the gas comes in contact with air only instead of with burning gases.

745,441. Motor Car.—Edouard Hospitalier, of Paris, France. December 1, 1903. Filed March 31, 1902.

A large horizontal flywheel is provided on a car, and is driven from the engine, the object being to use the energy stored up in the flywheel for starting the car and in climbing steep grades. The flywheel is universally joined to the lower end of a vertical and elastically yielding shaft and without other means of support, whereby it is enabled to maintain its plane of rotation in all positions of the car. The inventor says:

"When ascending steep and rather long hills, which may cause the motor to slow down by more than 30 per 100 of its normal speed, it is advisable to stop and allow the flywheel to regain its normal speed or more, and then restart the vehicle. In this manner any ascent may be climbed by successive stages, yet without fear of falling entirely.

"It may be thought that for long hills it would be most advantageous to use a slower speed meshing; but it is easy to demonstrate by calculations that such an advantage is indeed an illusion by reason of the attendant complications of the mechanism and extra weight, together with additional difficulty in the operation,

though it may not be incompatible in every case to be utilized in conjunction with my accumulator flywheel, which latter forms the chief subject of my invention."

We hardly believe that this method of ascending hills will appeal to the experienced automobilist or the practical engineer.

745,475. Sparking Device.—C. L. Barker, of Norwalk, Conn. December 1, 1903. Filed June 11, 1903.

745,809. Vehicle Spring.—Fay O. Farrell, of Dubuque, Ia. December 1, 1903. Filed September 4, 1903.

745,878. Pneumatic Tire Protector.—G. E. Mentel and S. N. Mentel, of Springfield, Ohio. December 1, 1903. Filed October 1, 1903.

745,423. Explosive Engine.—Charles R. Daellenbach, Parkgate, Pa. December 1, 1903. Filed September 29, 1902.

745,443. Detachable Tire.—Herbert E. Irwin, Galesburg, Ill. December 1, 1903. Filed May 13, 1903.

745,604. Secondary Battery.—Gustave K. Hartung, New York, N. Y. December 1, 1903. Filed September 16, 1903.

745,632. Two Speed Gear for Velocipedes, Motor Cycles, Etc.—Louis Lecarme, Paris, France. December 1, 1903. Filed January 20, 1903.

745,638. Ball Bearing Construction.—William H. Makuchan, Princeton, Ill. December 1, 1903. Filed June 29, 1903.

745,654. Cooler for Motor Vehicles.—Ransom E. Olds, Detroit, Mich. December 1, 1903. Filed October 18, 1901.

745,700. Crank Shaft for Engine.—Ralph B. Weaver, Milton, Mass. December 1, 1903. Filed July 8, 1903.

745,701. Cooling Device for Explosion Engines.—Ralph B. Weaver, Milton, Mass. December 1, 1903. Filed July 8, 1903.

746,701. Explosive Engine.—Warren Hibbard, Charles Hibbard and Sumner Hibbard, Sandy Hill, N. Y. December 15, 1903. Filed August 13, 1902.

746,833. Full Regulator for Gasoline Motors.—Herbert H. Henneghin, Chicago, Ill. December 15, 1903. Filed February 21, 1903.

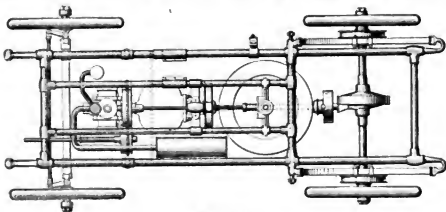
747,221. Variable Speed Transmission Gearing.—Thornton B. Rennell, Denver, Col. December 15, 1903. Filed March 12, 1903.

746,840. Explosive Engine.—Hobert J. Hurd, Bridgeport, Conn. December 15, 1903. Filed December 11, 1901.

746,652. Motor Cycle.—James G. Accles and Frederick H. de Vuille, Birmingham, and William Starley, Coventry, England. December 15, 1903. Filed May 21, 1903.

744,418. Muffler for Explosive Engines.—Robert C. Shepherd, of Los Angeles, Cal., November 17, 1903. Filed December 22, 1902.

The muffler consists of a cylindrical shell, heads closing each end of the shell, an asbestos pad carried by one end of the shell, an inlet pipe passing through said head, a spreader carried by the inner end of the inlet pipe attached thereto by slim supports, and a coiled pipe in the other end of the



No. 745,441.

shell having numerous turns and communicating with the outside. There is a considerable space interposed between the spreader and the first turn of the coil. The coiled pipe acts as a condenser, the products of combustion being condensed to a marked degree while passing through the series of coils.

745.193. Flexible Connector for Batteries.—Patrick Kennedy, of New York, N. Y. November 24, 1903. Filed June 30, 1903.

A coupling for storage batteries, comprising a socket piece of relatively soft metal (lead antimony) provided with a head having a projecting screw of harder metal (brass), with its extremity secured in said head, and a stem with a socket to receive the conductor, and a nut of lead antimony having an internally screw threaded block of brass embedded therein to receive the screw on the socket piece.

The advantage of surrounding the brass screw and nut with lead antimony is that sulphuric acid will not corrode the lead antimony, while it would attack the brass.

744.776. Power Translating Device.—George W. Marble, of Buchanan, Mich. November 24, 1903. Filed January 19, 1903.

745.102. Sparking Plug for Explosion Motors.—Johann Geisslinger, of Nuremberg, Germany. November 24, 1903. Filed July 8, 1903.

In this plug the parts, instead of being clamped together, are simply held together by screw threads.

746.133. Gas Engine.—Lewis H. Nash, South Norwalk, Conn. December 8, 1903. Filed December 28, 1896.

746.207. Repair Device for Pneumatic Tires.—John R. Vosburgh, Johnstown, N. Y. December 8, 1903. Filed September 10, 1903.

745.063. Carburetor for Gasoline Engines.—Peter Jenness, of Philadelphia, Pa. November 24, 1903. Filed September 5, 1903.

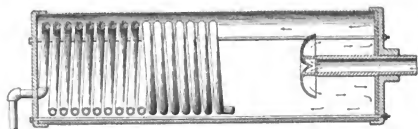
The carburetor has a cork float to which is directly attached a ball gasoline valve. The air enters the mixing chamber through an inlet at the lower part, and the mixture leaves the chamber through an opening near the top of the chamber. A throttle valve is located within the mixing chamber. The hub of the air throttle valve is threaded and through it passes a valve by which the gasoline spray nozzle may be closed more or less. The stem of this valve is provided with an arm by which it can be held from rotating, and it will be noticed that in this manner the gasoline valve is adjusted simultaneously whenever the air valve is adjusted.

746.212. Explosion Engine.—William C. Weatherholt, Columbus, Ohio. December 8, 1903. Filed June 4, 1903.

746.216. Power Transmission Gearing.—George E. Whiteside, Wilson, N. Y. December 8, 1903. Filed November 17, 1902.

745.157. Means for Operating Motor Vehicles.—Clyde J. Coleman, New York, N. Y. November 24, 1903. Filed February 11, 1901.

746.227. Electric Battery.—Sakizo Yai,



No. 744.418.

Tokio, Japan. December 8, 1903. Filed May 21, 1903.

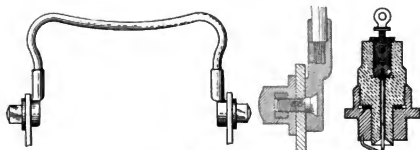
746.289. Storage Battery.—Rufus N. Chamberlain, Depew, N. Y. December 8, 1903. Filed May 13, 1901.

746.583. Gear Wheel.—Frank Saxon, Worthington, Minn. December 8, 1903. Filed April 9, 1903.

746.626. Steam Engine.—William Dieter, New York, N. Y. December 8, 1903. Filed June 4, 1903.

—Paul Symalstvedt, of Glenview, Ill. November 17, 1903. Filed September 14, 1899.

Refers to an electric vehicle driven by a single motor. The latter is placed on the running gear reaches, just in front of the rear axle, and has a hollow shaft. The differential gear is placed at one side of the motor and the broken differential shaft passes concentrically through the motor shaft. The rear wheels are driven by spur pinions and internal gear wheels. There are ball bear-



No. 745.193.

745.703. Gas Engine.—George Westinghouse, Pittsburg, Pa. December 1, 1903. Filed December 24, 1900.

745.704. Gas Engine.—George Westinghouse, Pittsburg, Pa. December 1, 1903. Filed April 30, 1901.

745.814. Reversible Driving Gear.—William E. Gibbs, Fanwood, N. J. December 31, 1903. Filed March 11, 1902.

745.040. Pneumatic Tire.—Thomas J. Cooper, Paterson, N. J. November 24, 1903. Filed March 25, 1903.

745.215. Gas or Oil Engine.—Alfred G. Melhuish, Edmonton, England. November 24, 1903. Filed May 16, 1902.

745.226. Controller for Automobiles.—Laurence Mott, New York, N. Y. November 24, 1903. Filed December 26, 1902.

744.434. Vehicle Driving Mechanism.

ings outside the spur pinions, supported by brackets extending from the motor casing.

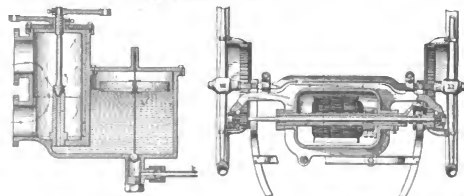
747.064. Snow or Ice Automobile.—Thomas Gunderson, McIntosh, Minn. December 15, 1903. Filed April 29, 1903.

747.182. Catalytic Igniter for Explosive Motors.—Thomas B. Jeffery, Kenosha, Wis. December 15, 1903. Filed March 11, 1901.

747.217. Electric Motor.—Leroy S. Pfouts, Canton, Ohio. December 15, 1903. Filed March 5, 1903.

747.235. Carburetor for Liquid Fuel Engines.—Joseph H. Saris, Beloit, Wis. December 15, 1903. Filed April 15, 1903.

747.264. Carburetor for Explosion Engines.—Thomas L. Sturtevant, Quincy, and Thomas J. Sturtevant, Newton Center, Mass. December 15, 1903. Filed May 29, 1902.



No. 745.063.

No. 744.434.

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IS READY.

A REVELATION IN VALUES.

Two Cylinder, Motor. Slide Gear Transmission.

(EIGHT HORSE POWER AND
PERFECTLY BALANCED.)

(THREE SPEEDS AHEAD—
TWO REVERSE.)

Mechanical Lubrication. Multiple Disc Clutch.

(THE KIND USUALLY FOUND
IN THE \$5,000 CARS.)

(STARTS WITHOUT JERK, HOLDS
EVERYTHING IN SIGHT.)

ALL
FOR **\$750**

MATCH IT IF YOU CAN.

A LIMITED NUMBER OF 1904 AGENCIES OPEN.

CORRESPOND WITH US, OR ARRANGE TO SEE THE CAR AT OUR OWN
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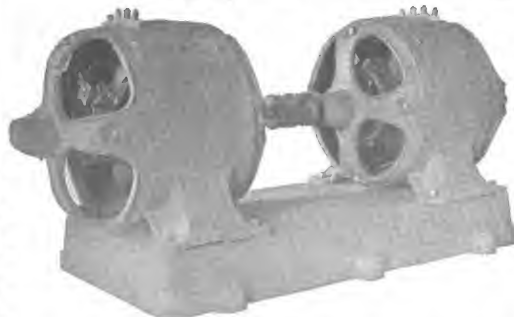
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NOTICE.

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NOTICE.

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SECOND ENDURANCE RUN NUMBER.

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THE F. B. STEARNS CO.

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No other manufacturers or importers are authorized to make or sell gasoline automobiles, and any person making, selling or using such machines made or sold by any unlicensed manufacturers or importers will be liable to prosecution for infringement.

**ASSOCIATION OF LICENSED
AUTOMOBILE MANUFACTURERS**

No. 7 EAST FORTY-SECOND STREET, NEW YORK

...THE... Horseless Age

VOLUME 12.

OCTOBER 28, 1903.

NUMBER 18.

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NOTICE.

To Manufacturers, Dealers, Importers, Agents and Users of

Gasoline Automobiles

United States Letters Patent No. 549,160, granted to George B. Selden, November 5th, 1895, controls broadly all gasoline automobiles which are accepted as commercially practical. Licenses under this patent have been secured from the owners by the following named manufacturers and importers:

ELECTRIC VEHICLE CO.
THE WINTON MOTOR CARRIAGE CO.
PACKARD MOTOR CAR CO.
OLDS MOTOR WORKS.
KNOX AUTOMOBILE CO.
THE HAYNES-APPERSON CO.
THE AUTO CAR CO.
THE GEORGE N. PIERCE CO.
APPERSON BROS. AUTOMOBILE CO.
SEARCHMONT AUTOMOBILE CO.
LOCOMOBILE CO. OF AMERICA.
THE PEERLESS MOTOR CAR CO.
U. S. LONG DISTANCE AUTO. CO.
WALTHAM MANUFACTURING CO.

POPE MOTOR CAR CO.
THE J. STEVENS ARMS & TOOL CO.
H. H. FRANKLIN MFG. CO.
CHARRON, GIRARDOT & VOIGT CO. OF AMERICA
(SMITH & MABLEY).
THE COMMERCIAL MOTOR CO.
BERG AUTOMOBILE CO.
CADILLAC AUTOMOBILE CO.
NORTHERN MFG. CO.
POPE-ROBINSON CO.
THE KIRK MFG. CO.
ELMORE MFG. CO.
E. R. THOMAS MOTOR CO.
BUFFALO GASOLENE MOTOR CO.
THE F. B. STEARNS CO.

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ASSOCIATION OF LICENSED AUTOMOBILE MANUFACTURERS

No. 7 EAST FORTY-SECOND STREET, NEW YORK

...THE... Horseless Age

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THE AUTO CAR CO.
THE GEORGE N. PIERCE CO.
APPERSON BROS. AUTOMOBILE CO.
SEARCHMONT AUTOMOBILE CO.
LOCOMOBILE CO. OF AMERICA.
THE PEERLESS MOTOR-CAR CO.
U. S. LONG DISTANCE AUTO. CO.
WALTHAM MANUFACTURING CO.

POPE MOTOR CAR CO.
THE J. STEVENS ARMS & TOOL CO.
H. H. FRANKLIN MFG. CO.
CHARRON, GIRARDOT & VOIGT CO. OF AMERICA
(SMITH & MABLEY).
THE COMMERCIAL MOTOR CO.
BERG AUTOMOBILE CO.
CADILLAC AUTOMOBILE CO.
NORTHERN MFG. CO.
POPE-ROBINSON CO.
THE KIRK MFG. CO.
ELMORE MFG. CO.
E. R. THOMAS MOTOR CO.
BUFFALO GASOLINE MOTOR CO.

THE F. B. STEARNS CO.

These manufacturers are pioneers in this industry and have commercialized the gasoline vehicle by many years of development and at a great cost. They are the owners of upward of four hundred United States patents, covering many of the most important improvements and details of manufacture. Both the basic Selden patent and all other patents owned as aforesaid will be enforced against all infringers.

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**ASSOCIATION OF LICENSED
AUTOMOBILE MANUFACTURERS**

No. 7 EAST FORTY-SECOND STREET, NEW YORK

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...THE... Horseless Age

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NOTICE!

Users, Agents, Importers, Dealers and Manufacturers of *Gasoline Automobiles*

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MANUFACTURERS:

ELECTRIC VEHICLE CO.
THE WINTON MOTOR CARRIAGE CO.
PACKARD MOTOR CAR CO.
OLDS MOTOR WORKS.
KNOX AUTOMOBILE CO.
THE HAYNES-APPERSON CO.
THE AUTO CAR CO.
THE GEORGE N. PIERCE CO.
APPERSON BROS. AUTOMOBILE CO.
SEARCHMONT AUTOMOBILE CO.
LOCOMOBILE CO. OF AMERICA.
THE PEERLESS MOTOR CAR CO.
U. S. LONG DISTANCE AUTO. CO.
WALTHAM MANUFACTURING CO.

POPE MOTOR CAR CO.
THE J. STEVENS ARMS & TOOL CO.
H. H. FRANKLIN MFG. CO.
CHARRON, GIRARDOT & VOIGT CO. OF AMERICA
(SMITH & MABLEY).
THE COMMERCIAL MOTOR CO.
BERG AUTOMOBILE CO.
CADILLAC AUTOMOBILE CO.
NORTHERN MFG. CO.
POPE-ROBINSON CO.
THE KIRK MFG. CO.
ELMORE MFG. CO.
E. R. THOMAS MOTOR CO.
BUFFALO GASOLENE MOTOR CO.
THE F. B. STEARNS CO.

IMPORTERS,

having licenses for the importation of all makes of foreign cars:

CHARRON, GIRARDOT & VOIGT CO OF
AMERICA (SMITH & MABLEY).
CENTRAL AUTOMOBILE CO.

STANDARD AUTOMOBILE CO.
E. B. GALLAHER.

These manufacturers are pioneers in this industry and have commercialized the gasoline vehicle by many years of development and at great cost. They are the owners of upward of four hundred United States Patents—covering many of the most important improvements and details of manufacture. Both the basic Selden patent and all other patents owned as aforesaid will be enforced against all infringers.

No other manufacturers or importers than the above are authorized to make or sell gasoline automobiles; and any person making, selling or using such machines made or sold by any unlicensed manufacturer will be liable to prosecution for infringement.

A suit was commenced on October 29 against a dealer and against a manufacturer infringing United States Letters Patent No. 549,160.

A suit was commenced November 5 against a purchaser and user of an automobile infringing the same patent.

ASSOCIATION OF LICENSED AUTOMOBILE MANUFACTURERS

No. 7 EAST FORTY-SECOND STREET, NEW YORK

...THE...

Horseless Age

VOLUME 12.

NOVEMBER 18, 1903.

NUMBER 21.

THE STANDARD AUTOMOBILE



Winton success has made it that standard by which automobile excellence is gauged. The 1904 car reaches the highest pinnacle of superiority ever attained. Read why this is so in our advance booklet, a copy of which is yours upon request.

Price, complete with Canopy Top, Full Lamp Equipment, etc., \$2,500, f. o. b. Cleveland.

THE WINTON MOTOR CARRIAGE CO., CLEVELAND, O., U. S. A.

NEW YORK.

PHILADELPHIA.

BOSTON.

CHICAGO.

Member Association of Licensed Automobile Manufacturers.

COPYRIGHT, 1903, BY E. P. INGERSOLL.

Par Excellence

THE MORGAN & WRIGHT CLINCHER

A Tire of superior merit in style, construction, resiliency and durability.



Designed to Minimize Tire Troubles

A SIGNIFICANT FACT.—More years of actual experience in successful tire manufacturing enter into this tire than is true of any other tire on the market.

MORGAN & WRIGHT
CHICAGO

NEW YORK: 214 West Forty-seventh Street.

ST. LOUIS: 1204 South Seventh Street.

DAYTON: 417 East Fifth Street.

NEW YORK
PUBLIC LIBRARY
ASTOR, LENOX
TILDEN FOUNDATION

...THE... Horseless Age

VOLUME 12.

NOVEMBER 25, 1903.

NUMBER 22.

This Is the Car That Winton Builds.



Every car that leaves the Winton factory is manufactured under the direct personal supervision of Mr. Alexander Winton. This guarantees that each Winton car embodies the most advanced ideas in automobile engineering and that these ideas are expressed in a conscientiously manufactured product.

Price, complete with canopy top, full lamp equipment, etc., \$2,500 f. o. b. Cleveland.

First to achieve success, the Winton has scored annual triumphs founded on excellence. Another of these triumphs is at hand. Participate in it by having a

Winton 1904 Touring Car

with its perfected transmission, insuring virtually no loss of power, its lubricating system that defeats forgetfulness and its absolutely positive ignition system. We have overcome the difficulties of transmission, lubrication and ignition. See how we have done by examining the car at branch or agency depot. Our advance booklet details Winton features. Shall we send you a copy?

The Winton Motor Carriage Co.

Cleveland, Ohio, U. S. A.

NEW YORK.

BOSTON.

PHILADELPHIA.

CHICAGO.

Member Association of Licensed Automobile Manufacturers.

THE MORGAN & WRIGHT CLINCHER

STRENGTH

AN EXTREMELY TOUGH CASING
AND A REINFORCED SHOE WHICH
FITS THE RIM PERFECTLY.

RESILIENCY

EXTRA HEAVY RUBBER ON THE
TREAD—ADDING MATERIALLY
TO ITS EASE AND DURABILITY.



FORTIFIED

AT EVERY POINT AGAINST TIRE
TROUBLES.

EMBODIES

TWENTY YEARS' EXPERIENCE
IN SUCCESSFUL TIRE MAKING.

MORGAN & WRIGHT
CHICAGO

NEW YORK: 914 W. 47th Street.

DAYTON: 417 E. 5th Street.

ST. LOUIS: 1204 S. 7th Street.

...THE...

Horseless Age

VOLUME 12.

DECEMBER 9, 1903.

NUMBER 24.

TRYING TO TELL

about Winton features of superiority in a one page advertisement is like trying to crowd a thousand gold dollars into a champagne glass. It can't be done. It would be different if the Winton had only one point of merit.



But the car that is manufactured under the personal supervision of Mr. Alexander

WINTON

has for 1904 so stupendous an array of superior features that we cannot hope to talk about them all in this space. We can only tell you that the Winton is the standard by which automobile excellence is judged, asking you to investigate the claim and satisfy yourself of its truth.

Price, complete with canopy top, full lamp equipment, etc., \$2,500 f. o. b. Cleveland.

Transmission,
Ignition and
Lubrication
reach a new
excellence in
the 1904 Winton
Car.

The Winton Motor Carriage Co.

Member Association of Licensed Automobile Manufacturers.

FACTORY AND GENERAL OFFICES:

Cleveland, Ohio, U. S. A.

NEW YORK.

BOSTON.

PHILADELPHIA.

CHICAGO.



ONE END OF CREST MACHINE SHOP.

8 HORSE POWER
AIR COOLED MOTOR.
SHAFT DRIVE.
NO VIBRATION.



1904 Model D.

WHEEL STEER.
BEAUTIFUL FINISH.
UNEQUALED SIMPLICITY
LOW COST.

**CREST AGENCIES
CIRCLE THE GLOBE**

**THE
CREST-
MOBILE**

IS THE BEST CAR
MADE IN AMERICA

\$750 **\$850**
FOR TWO FOR FOUR

**CREST
SUCCESS**

HAS BEEN WON BY EX-
PERIENCE, MERIT AND
HONEST CONSTRUCTION

*Write for Booklet,
Department K.*

**CREST
MFG. CO.**

CAMBRIDGE, MASS.



ONE END MAIN ERECTING SHOP.

...THE...

Horseless Age

VOLUME 12.

DECEMBER 16, 1903.

NUMBER 25.

THE PRICE of PEACE

in automobile use is the price of the 1904 Winton Touring Car. You can pay more for other cars, but in the Winton alone can you secure that freedom from the difficulties of faulty transmission, ignition and lubrication that is assured by our superb improvements for 1904.



THE WINTON

is nearest the goal of perfection. The genius of Mr. Alexander Winton has made it so. Mr. Winton directs the manufacture of all Winton cars, having personal supervision over the Winton plant, which is the largest exclusive automobile factory under the sun.

We are now delivering 1904 cars. By ordering promptly you can have a Winton at your service without delay.

Price, complete with canopy top, full lamp equipment, etc., \$2,500 f. o. b. Cleveland.

SEE THE
WINTON
IN SPACES
90 AND 92
AT THE
NEW YORK
SHOW.

The Winton Motor Carriage Co.

Member Association of Licensed Automobile Manufacturers.

FACTORY AND GENERAL OFFICES:

Cleveland, Ohio, U. S. A.

NEW YORK.

BOSTON.

PHILADELPHIA.

CHICAGO.

C1904 R1904 E1904 S1904 T1904 M1904 O1904 B1904 I1904 L1904 E

CREST AGENCIES CIRCLE THE GLOBE. IT'S THE CAR FOR YOU.

AIR COOLED

SHAFT DRIVE

WIDE BODY

NO VIBRATION

SIMPLICITY

WHEEL STEER

AMPLE HORSE

POWER AND BUILT

UNDER ONE ROOF IN A

1,000 CREST FACTORY

\$8
50



The 1904 Crestmobile contains more desirable features than found on any automobile manufactured, no matter what the price.

It is a machine built on honor by makers with years

of experience in

building gaso-

line motors. The

Crest is an honest proposition from the

ground up, and a money maker for good live agents.

Write for Wireless.
Department K.

CREST MFG. CO. CAMBRIDGE, MASS.

DIAMOND TIRES

For 1904.



The Tires whose records of results in the most severe tests and in daily service, under both normal and abnormal conditions, **have convinced men of the widest experience that our 1904 construction is not and never has been equaled.**

The Tires whose excellence cannot but be an important factor in the forward march of automobile building and using in general.

The Tires whose proved economy should be a matter of direct personal interest to every owner or prospective purchaser of an automobile.

The Tires which made the famous record of $5\frac{1}{2}$ mills per mile in the Endurance Run.

Spaces 57-58 (Main Platform)
at New York Auto Show.
Spaces 159-160 at Chicago Auto Show.

THE DIAMOND RUBBER CO., Akron, Ohio.

BRANCHES—East.

NEW YORK: 15 Warren Street and 1717 Broadway. BOSTON: 174
Columbus Avenue. PHILADELPHIA: 391-393 North Broad Street.
BUFFALO: 41 Court Street.

BRANCHES—West.

DETROIT: 210 Woodward Avenue. CLEVELAND: 223 Huron Street.
CINCINNATI: 2101 South Street. CHICAGO: 165-169 Lake Street.
DENVER: 1655 Blake Street. SAN FRANCISCO: 8 Beale Street.

...THE...

Horseless Age

VOLUME 12.

DECEMBER 23, 1903.

NUMBER 26.

The Real Test Is Service

Automobile merit cannot be judged by the adjectives in an advertisement. To buy a car merely on the strength of a maker's rhetoric would be like electing candidates to office on their own recommendations. The real test in both cases is service. The car that has already shown merit is the one most likely to show merit in future.



THE WINTON

is nearest the goal of perfection. Under every condition of service it has satisfied its users. Improvements for 1904 increase its serviceability and make operation wonderfully simple.

Proof of these statements is to be found in the Winton 1904 Touring Car. See it at Winton branch depots or agencies, or in New York Show, Spaces 90 and 92.

We are already delivering.

Price, complete with canopy top, full lamp equipment, etc., \$2,500 f. o. b. Cleveland.

MR. ALEXANDER
WINTON'S SUPER-
VISION OF WINTON
MANUFACTURE IS
A GUARANTEE OF
QUALITY.

The Winton Motor Carriage Co.

Member Association of Licensed Automobile Manufacturers.

FACTORY AND GENERAL OFFICES:

Cleveland, Ohio, U. S. A.

NEW YORK.

BOSTON.

PHILADELPHIA.

CHICAGO.

Mr. W. O. ADAMS, Manager Crest Manufacturing Co.:

Dear Sir—Commending your machine, will say that I have not yet been able to test it for the mile in two minute gait without the muffler. But for a hard worked runabout in mud, rain and over the worst of roads, day and night, it has been very satisfactory. I have used it every day in my work, save when laid up waiting for slight repairs.

Yours very truly, [Signed] Dr. S. W. ELLSWORTH.

BART LIVERPOOL, Ohio,
October 17, 1913.
W. O. ADAMS, Esq., Cambridge,
Mass.:

Dear Sir—Your favor of 14th inst. received, and in reply beg to say that my machine is now giving perfect satisfaction and I am more than surprised as to its hill climbing ability. I have been over some hills that I had no idea but that the machine would stop and I should have to let it run backward and take some other route, but in nearly every instance it climbed the hills with out the power on.

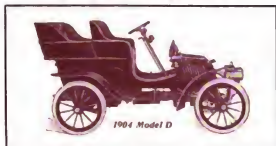
Some other new machines bearing great recommendations, costing a half more than mine and called to horse power, have been sent back to the factories because they won't go up the hills that my machine will. Personally I have not yet seen a machine that I would exchange for my Model "D" Crest Machine.

Yours very truly,

A. W. SCOTT.

THE Crestmobile

INVITES COMPARISON.



Shaft Drive, 8 H. P., No Vibration, Wheel Steer,
Perfect Air Cooled Motor, Ample Power, Superior
Beauty, Proven Reliability, Unequaled Simplicity

MODESTO, Cal., Sept. 20, 1903.
T. B. VAN ALSTYNE, Sales
Manager, Crest Manufacturing
Company, Cambridge, Mass.:

Dear Sir—The Crestmobile arrived safely, and I am more than delighted with her appearance.

You said in your last you would write more fully on your return from Washington. Up to date no letter has reached me.

I want you to send me contract for more territory or for the Pacific Coast, as my two brothers are going into business with me. If I can't have the Pacific Coast, extend territory as much as you can, for the Crest will be winner here.

The machine is certainly a wonder in heavy sand. Throw in the slow gear and she will take it hub deep as easy as it were gliding on a smooth surface.

Awaiting an early reply, I remain,
Yours very truly,

W. H. GREEN.

\$750
FOR TWO

No agent or user should buy before writing for Catalog to Dept. K.
Crest Mfg. Co. CAMBRIDGE, MASS.

\$850
FOR FOUR

DIAMOND TIRES



5½ Mills per Mile.
Spaces 57-58 (Main Platform)
at New York Auto Show.
Spaces 159-160 at Chicago Auto Show.

IN ACTUAL SERVICE ARE DOING MORE TO PROMOTE
ENTHUSIASM IN AUTOMOBILING THAN ANY OTHER ONE
THING CONNECTED WITH THE AUTOMOBILE INDUSTRY.

Service is the Severest but the Surest Test.

In our 1904 construction we have sacrificed absolutely nothing of resiliency or speed, but have gained so much in durability that we unhesitatingly declare there is no other automobile tire of equal or nearly equal excellence. We are ready with the proof — and the goods.

THE DIAMOND RUBBER CO., Akron, Ohio.

BRANCHES—East.

NEW YORK: 15 West Street and 170 Broadway. BOSTON: 174 Columbus Avenue. PHILADELPHIA: 304-306 North Broad Street. BUFFALO: 41 Court Street.

BRANCHES—West.

DETROIT: 310 Woodward Avenue. CLEVELAND: 22 Huron Street. CINCINNATI: 139 Chest Street. CHICAGO: 107-109 Lake Street. DENVER: 1635 Blake Street. SAN FRANCISCO: 8 Beale Street.

...THE...

Horseless Age

VOLUME 12.

DECEMBER 30, 1903.

NUMBER 27.

WINTON

Our new model for 1904 positively presents the best system of transmission, ignition and lubrication. Do you appreciate what great advantage this gives the Winton operator?



Winton Touring Car, superb in service. Price, completely equipped, \$2,500.

One can find nothing but highest quality materials throughout Winton construction.

The Winton Motor Carriage Co.

CLEVELAND, OHIO, U. S. A.

Members Association of Licensed Automobile Manufacturers.

NEW YORK SHOW, SPACES 99 AND 92

NEW YORK.

BOSTON.

PHILADELPHIA.

CHICAGO.

"CREST AGENCIES CIRCLE THE GLOBE."

It will pay you to look up the merits of this popular car before placing your orders for 1904. The Crestmobile has more desirable features than can be found in any automobile manufactured, no matter what the price.

\$750 FOR TWO PERSONS

A CAR built by manufacturers with years of experience in the Gas Engine business. The Crestmobile is an honest proposition from the ground up. The workmanship, finish and material are the best that money can buy. It has the size, appearance, power, durability and speed of expensive touring cars costing four times the price. These are a few reasons why the Crest is the car for you.



Nothing to watch
but the Policeman

1904 CRESTMOBILE

"THE CREST IS THE CAR FOR YOU."

We have retained many of our 1903 features with the following improvements: A much larger and more powerful motor—fan cooled, wider body, larger tonneau, option of 45 or 54 in. tread, lever or wheel steer, any color.

\$850 FOR FOUR PERSONS

The vast amount of money spent in worthless experiments, and the many complicated parts which go to make up the traditional type of automobile is spent in perfecting the smaller number of parts constituting the Crestmobile. The 1904 Crest is the simplest automobile made. No water supply to watch, no water pipes and jackets to freeze. Shaft drive. No chains to break or regulate.

WRITE FOR CATALOGUE. DEPT. K.

CREST MFG. CO., CAMBRIDGE, MASS.

5½ MILLS PER MILE.

By the Test of Actual Service



DIAMOND TIRES

Prove Their Sterling Worth.

Our 1904 construction has not only speed and resiliency, but durability positively unequaled.

Spaces 57-58 (Main Platform)

at New York Auto Show.

Spaces 159-160 at Chicago Auto Show.

"IMPORTANT IF TRUE," YOU SAY, PERHAPS.

It is so extremely important that no man personally interested in automobiling or a single automobile CAN AFFORD TO NEGLECT INVESTIGATING.

We invite inquiries and the most searching comparisons.

THE DIAMOND RUBBER CO., Akron, Ohio.

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NEW YORK: 15 Warren Street and 1717 Broadway. BOSTON: 171 Columbus Avenue. PHILADELPHIA: 301-306 North Broad Street. BUFFALO: 41 Court Street.

BRANCHES—West.

DETROIT: 210 Woodward Avenue. CLEVELAND: 223 Huron Street. CINCINNATI: 150 West Street. CHICAGO: 107-109 Lake Street. DENVER: 1655 Blake Street. SAN FRANCISCO: 8 Beale Street.



Single Cylinder Runabout, with Top, \$1,350.



Double Cylinder Runabout, \$2,800.



Double Cylinder Tourneau, \$2,200.

THE RUSH

FOR 1904

KNOX CARS

Nearly our whole output for 1903 was sold between January 1 and February 15, and many who neglected to place their orders before January 1 lost their chance. We are already shipping 1904 machines. All who have seen and tried them are convinced that they are far in advance of anything produced heretofore, and the rush to place orders has begun so early as to indicate that, by the time of the New York Show, our output for practically every desirable delivery date will be taken. : : : : : : :



Double Cylinder Surrey, \$2,200.



Single Cylinder Tourneau, \$1,500.



Single Cylinder Surrey, \$1,800.



Single Cylinder Surrey, without Rear Seat, \$1,400.

The 1904 Knox Line Is the Greatest Line Ever Offered to Agents.

The illustrations show only a part of it.

HAVE YOU PLACED YOUR ORDER?

New York Show: Spaces 61, 62 and 63.

Chicago Show: Spaces 9, 10, 11 and 12.

Knox Automobile Co.

Main Office and Works: SPRINGFIELD, MASS., U. S. A.

Member Association of Licensed Automobile Manufacturers.

Branch Offices: New York, Boston, Philadelphia.



ELEGANCE

in appearance is backed up by the highest mechanical efficiency in

Peerless Direct Drive Motor Cars

Send for descriptions of our new 24 and 25 H. P. four cylinder cars - \$3,700 to \$6,000. They are America's finest. Our exhibit at the Show will speak for itself.

AGENCIES IN THE PRINCIPAL CITIES.

Photographs of "Peerless Girl II," shown here, with, 1437 inches, suitable for framing, sent post-paid for 10 cents.

THE PEERLESS MOTOR CAR CO.
Cleveland, Ohio, U. S. A.

Member Association of Licensed Automobile Manufacturers.

DOUBLE
OPPOSED
AIR COOLED
MOTOR.

"Imperial" Gasoline Automobiles

ARE ALWAYS READY.

THE HOTTEST DAYS OF SUMMER.

THE COLDEST DAYS OF WINTER.

BEVEL GEAR
DRIVE,
SLIDING
GEAR
TRANS-
MISSION.



IMPERIAL, MODEL "A."

AGENTS WANTED IN UNOCCUPIED TERRITORY

RODGERS & CO., COLUMBUS, OHIO,
U. S. A.

WE MANUFACTURE Four Different Models

MODEL A—Open Runabout.

MODEL B—Runabout furnished with

Falling Top or Doctor's Top.

MODEL C—Delivery Wagon.

MODEL D—Full Glass Doctor's Car.

All of which we will have on exhibition at the Fourth Annual Automobile Show in New York, and the Third Annual Automobile Show in Chicago.

HAS ALL THE LATEST IMPROVEMENTS

Our "IMPERIAL" Automobiles are driven by double opposed air cooled engines (no water, no radiator or is, no pump), placed in front, away from all dirt and dust. All parts accessible by simply lifting the hood. Has bevel gear drive instead of sprocket chain, sliding gear transmission. Two brakes. Automatic spark timer. Forced feed oiler of large capacity. Tilting steering wheel. Our spring suspension we claim is the most practical and best ever shown on any automobile. Body of handsome design, roomy and comfortable, and with ample room back of seat for carrying a number of parcels. Upholstered in the finest quality of leather.

BOOKLET ON APPLICATION.

PACKARD

Model "L" 1904



22 Horse Power. Weight 1,870 Pounds.

ONE HORSE POWER FOR EVERY 85 POUNDS WEIGHT.
SPEED RANGE OF 4 TO 40 MILES PER HOUR WITHOUT CHANGE OF GEAR.
UPON HIGH SPEED EVERY AVAILABLE OUNCE OF MOTIVE POWER IS
TRANSMITTED DIRECTLY TO THE DRIVE WHEELS WITHOUT SPEED LOSS.
STARTS READILY IN ALL KINDS OF WEATHER, AND HAS POWER AND
SPEED TO SPARE AT ALL TIMES.

\$3,000

SEND FOR ILLUSTRATED LITERATURE AND NAME OF NEAREST AGENT.

Packard Motor Car Co., DETROIT, MICH.
U. S. A.

— DEPT. 4 —

Member Association of Licensed Automobile Manufacturers.

A New Year's Greeting to Automobilists

*May your trips be marked with
milestones of contentment and all
the signposts point straight and true
to pleasures ahead!* ♪ ♪ ♪ ♪

A User of **GOODRICH TIRES** is full of Cheer and Happy Wishes.

THE B. F. GOODRICH COMPANY,

Akron Rubber Works, Akron, Ohio.

NEW YORK:
66-68 Reade St. and 1625 Broadway.

PHILADELPHIA:
922 Arch Street.

DETROIT:
80 East Congress Street.

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BUFFALO:
9 West Huron Street.

DENVER:
1444 Curtis Street.

CHICAGO:
141 Lake Street.

SAN FRANCISCO:
392 Mission Street.

LONDON, E. C.:
7 Snow Hill.

FOURTH ANNUAL AUTOMOBILE SHOW

Under the auspices of the AUTOMOBILE CLUB OF AMERICA,
NATIONAL ASSOCIATION OF AUTOMOBILE MANUFACTURERS,
and MADISON SQUARE GARDEN COMPANY AT

MADISON SQUARE GARDEN
NEW YORK

SPECIAL NOTICE

The trade admitted free up to 1 o'clock
each day upon presentation of business card
and registering name and address at the
BUREAU of INFORMATION



**January 16
to 23, 1904**

FRANK W. SANGER, Manager

STEARNS

"RUNS LIKE A DEER."

ANNOUNCEMENT FOR 1904.

IN placing our 1904 car upon the market, we beg to state that the satisfaction given by our cars in 1903 has strengthened our conviction that we are working along right lines in following out a policy of **improvement** rather than one of **alteration**. Our success in the past year has shown us the wisdom of retaining all **fundamental features** of **STEARNS TOURING CARS**. Hence, we offer for 1904 an **Improved Stearns** as a high standard of excellence in all the points which go to make the ideal car for touring. Namely: power, speed, durability, simplicity of construction, comfort, reliability, ease of control and noiselessness.



Stearns 24 H. P. Gasoline Touring Car.

EXCLUSIVE FEATURES OF STEARNS 1904 CAR:

FIRST—An improved oiling device, by means of which every drop of oil is fed positively to all bearings and can be seen by the driver, and the amount of oil fed to each bearing can be instantly increased or diminished.

SECOND—An improved inlet valve, permitting a quicker and more sensitive action.

THIRD—A new type of atomizer, which adjusts itself to every condition of load and speed of the engine and insures noiselessness.

FOURTH—A new throttle, which is very sensitive and very simple, and which, in connection with the inlet valve and atomizer, makes a perfect controlling device.

FIFTH—New spring suspension, with 44 inch rear springs and 40 inch front, lowering the body 3 inches. These springs are made of special steel and add greatly to the easy riding qualities of the car.

SIXTH—34x4 inch front tires, 34x4 1/2 inch rear tires, thus insuring immunity from tire troubles.

SEVENTH—Strengthened front axle.

EIGHTH—We have lightened our car so that, while retaining its strength, we now have 1 horse power for every 100 pounds of weight.

Price \$3,000, f. o. b. Cleveland.

Write for Illustrated Catalogue and Booklets describing Endurance Run and return trip to New York.

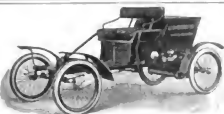
THE F. B. STEARNS CO.

Euclid and Lakeview Avenues, CLEVELAND, OHIO, U. S. A.

Licensed under Selden Patents. Agent for California: A. P. Worthington, 35 S. Broadway, PASADENA.

Do You Know

that every grocer, butcher, baker, laundry and dry goods store in your town needs one of our Buckboards with delivery box to deliver their hurry telephone orders? If you are awake you can get our agency and sell from ten to fifty of these machines in your town before your competitors know what you are about. The Buckboard



THE ORIENT BUCKBOARD.
Price \$425.
Delivery Box \$18 Extra.

will do as much work in a day as three horses, and after business hours, with the delivery box removed, the little machine is ready to go any distance for pleasure. A word to the wise is sufficient; don't spend any time thinking about it, but get it. It is one of those chances that do not happen every year.

WALTHAM MFG. CO., Waltham, Mass.

Member of the Association of Licensed Automobile Manufacturers.

Paris Show Report.

THE AUTOCAR says, December 12, 1903, page 508, in its preliminary description of the Paris Show: "Originality has taken the place of wholesale copying. Simplicity of design and lightness of construction combined with strength are the main features. * * * The magneto is being used more extensively and on the big cars it is usual to have the double ignition. * * * The firm" (Panhard & Co.) "have decided to make the three cylinder motor of 12 horse power one of their features for 1904." These have been standard DURYEA features for seven years. DURYEAS are leaders. See us at the Show.

DURYEA POWER CO., RIVER STREET,
READING, PA.



THE HILL Automatic Starter

Can be attached to any
Gasoline Car.

The operator mounts the car, pulls a small valve lever, throws in the clutch, and the car moves off.

Write us what car you use, and we will tell you all about it.

THE STEEL BALL COMPANY,
834 Austin Ave., Chicago, Ill.



THE OLD WAY.



THE NEW WAY.

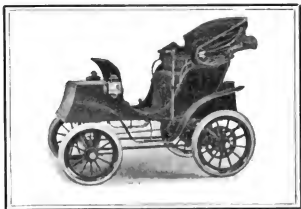
THE WONDERS WORKED

— BY THE —

Columbia Gasoline Touring Car

HAVE OVERSHADOWED ALL OTHER AUTOMOBILE TOPICS OF LATE, BUT WE DON'T WANT YOU TO LOSE SIGHT OF WHAT HAS BEEN DONE BY

Columbia ELECTRIC VEHICLES



October 27-28, a *Columbia Electric* covered the distance of 249½ miles between New York and Boston in 22 hours 52 minutes running time, beating the best previous record by several hours.

November 26, Thanksgiving Day, a *Columbia* won the Eagle Rock Hill Climbing Contest for electric vehicles, beating its nearest competitor up the mile grade by more than a minute.

Columbia Electric Vehicles include *Runabouts* (two styles), *Victorias*, *Surreys*, *Coupés*, *Broughams*, *Hansoms*, *Buses*, *Delivery Wagons*, *Trucks*.

CATALOGUE OF ALL COLUMBIA ELECTRIC AND GASOLINE VEHICLES WILL BE SENT ON REQUEST.

ELECTRIC VEHICLE COMPANY, HARTFORD, CONN.

Member Association of Licensed Automobile Manufacturers.

NEW YORK:

134, 136, 138 West 39th Street.

CHICAGO:

1413 Michigan Avenue.

BOSTON:

74, 76, 78 Stanhope Street.

THE OLDSMOBILE

LIGHT DELIVERY WAGON



has proven a "winner," from the first day it was placed on the market. It gives the progressive merchant just what he is looking for—a stylish, smart looking delivery wagon that will do the work of three horse drawn wagons for less than the cost of maintaining one.

PRICE \$850.

No matter what the weather or road conditions—"It delivers the goods."

When visiting the Madison Square Garden Automobile Show be sure and see the Oldsmobile line in spaces Nos. 75, 76 and 77. The Oldsmobile line will be seen in the Chicago Automobile Show in the Coliseum in spaces Nos. 57, 58, 75 and 77.

LIST OF AGENTS.

ALBANY, N. Y., Automobile Storage and Tred-

ing Co.

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ATLANTA, GA., Oldsmobile Co.

BATTLE CREEK, MICH., Frank Palmer.

BINGHAMTON, N. Y., R. W. Whipple.

BOSTON, MASS., Oldsmobile Co.

BUFFALO, N. Y., Jaynes Automobile Co.

CHARLESTON, S. C., Army Cycle Co.

CHARLOTTE, N. C., O. L. Harringer.

CHICAGO, ILL., Oldsmobile Co.

CLEVELAND, OHIO, Ohio Oldsmobile Co.

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DALLAS, TEX., Lipscomb & Garrett.

DENVER, COL., G. E. Hansen.

DAVENPORT, IA., Mason's Carriage Works.

DETROIT, MICH., Oldsmobile Co.

ERIE, PA., Jacob Roth.

GRAND RAPIDS, MICH., Adams & Hart.

GREENVILLE, S. C., Bate-Trennill Co.

HARRISBURG, PA., Kline Auto. and Cycle Co.

HOUSTON, TEX., Hawkins Auto. and Gas En-

gine Co.

INDIANAPOLIS, IND., Fisher Automobile Co.

JACKSON, MICH., Lockwood Brothers.

JACKSONVILLE, FLA., F. E. Gilbert.

KANSAS CITY, MO., E. P. Moriarty & Co.

KNOXVILLE, TENN., Rodgers & Co.

LANRING, MICH., W. K. Proddon & Co.

LITTLE ROCK, ARK., Arkansas Auto. Co.

LOS ANGELES, CAL., Oldsmobile Co.

LOUISVILLE, KY., Seiffert & Co.

MEMPHIS, TENN., White & Williams.

MILWAUKEE, WIS., Oldsmobile Co.

MINNEAPOLIS, MINN., A. F. Chase & Co.

MNFCY, PA., C. C. Werthington.

For complete information see our nearest selling agent, or write direct to Dept. 19

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NEWARK, N. J., Automobile Co.
NEW ORLEANS, LA., Abbott Cycle Co.
NEW YORK CITY, N. Y., Oldsmobile Co.
OMAHA, NEB., Olds Gasoline Engine Works.
PHILADELPHIA, PA., Oldsmobile Co.
PLAINFIELD, N. J., F. L. C. Martin Auto. Co.
PORTLAND, ORE., Merrill Cycle Co.
POUGHKEEPSIE, N. Y., John Van Benachoten.
RALEIGH, N. C., Raleigh Iron Works.
ROCHESTER, N. Y., Rochester Automobile Co.
SAGINAW, MICH., A. W. Norris.
SAN FRANCISCO, CAL., Flower Auto. Co.
SAVANNAH, GA., T. A. Bryson.
SOUTH MEALSTER, I. T., McIntyre & DeLong.
STRADESE, N. Y., Syracuse Auto. Co.
TEXARKANA, ARK., Texarkana Auto. and Repair Co.
TUCSON, ARIZ., F. Rosenthal.
UTICA, N. Y., C. M. Childs & Co.
WASHINGTON, D. C., National Capital Automobile Co.

'LIST OF FOREIGN AGENTS.

ARGENTINE REPUBLIC, Ramon Camasse & Co., Buenos Ayres.
New South Wales, Knowles Auto and Power Co., Sydney.
Victoria, Hall & Warden, Melbourne.
AUSTRALIA, Queensland, James Smith & Sons, Brisbane.
South Australia, Duncan & Fraser, Adelaide.

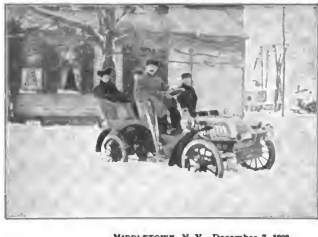
W. AUSTRALIA, American Motor Car and Vehicle Co., Perth.
AUSTRIA, I. T. Black, Vienna.
BELGIUM, Masric Evenport & Co., Brussels.
CANADA, Hyslop Brothers, Toronto.
DENMARK, T. T. Nielsen & Co., Copenhagen.
FRANCE, Eugene Moreille, Paris.
GERMANY (except Cologne), Gen. Vertrieb von Motorfahrzeugen, Berlin.
GERMANY (Cologne), L. Weller & Co., Cologne.
GREAT BRITAIN AND IRELAND, Jarrott & Lettis, Ltd., London.
HAWAIIAN ISLANDS, E. M. Halessted, Honolulu.
HOLLAND, Bingham & Co., Rotterdam.
ITALY, Victor Crestat, Turin.
JAPAN, Alphonse Brothers, Yokohama.
MEXICO, Oldsmobile Co.—Mohler & De Groom, Mexico City.
NEW ZEALAND, W. A. Ryan & Co., Ltd., Auckland.

RUSSIA, Gen. Zemlicka & Co., Moscow.
John Flatto & Co., Odessa.
Th. Thansky & Co., St. Petersburg.
Tadoue Kovatski & Tishel, Warsaw.
SOUTH AFRICA, White, Ryan & Co., Cape Town; Sheriff, Springler & Co., Johannesburg, Transvaal.
SWITZERLAND, Auto. Fabrik Orion A. G., Zurich.
TANANIA, A. O. Webster & Son, Hobart.
GENERAL EXPORT AGENTS, New York Export & Import Co., New York; Wm. E. Peck & Co., New York.

Member of the Association of Licensed Automobile Manufacturers.

OLDS MOTOR WORKS, Detroit, U. S. A.

THE THOMAS Good at All Seasons!



MIDDLETOWN, N. Y., December 7, 1903.
Gentlemen—The snow was from 18 to 12 inches deep. The car certainly did the work in good shape, and should effectually put to sleep the oft repeated inquiry, "Will it run in the snow?"
C. V. FREDMORE.

THE 1904 THOMAS FLYER.
GREAT POWER. 24 H. P. Three Cylinders.
LIGHT WEIGHT—83 lbs. per H. P.
VIBRATIONLESS—Silent.
SPEED—SAFETY—SIMPLICITY.

Send for Advance Specifications.

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1201 Niagara Street, BUFFALO, N. Y.

Member of Association of Licensed Automobile Manufacturers.

Road Experiences.

During the first three months of 1903 THE HORSELESS AGE printed 92 articles, under "Lessons of the Road."

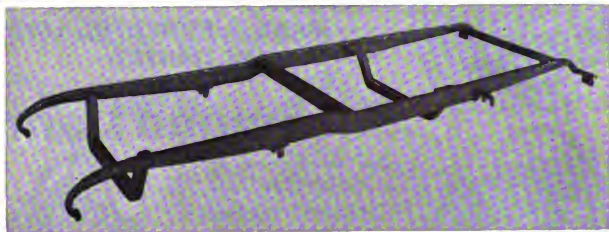
Descriptive, entertaining, instructive, practical, valuable, they form a compendium of useful information to every operator of gasoline, electric and steam automobiles who would know what difficulties are likely to be encountered on the road and how to overcome them.

These contributions are a regular feature of THE HORSELESS AGE and of NO OTHER AUTOMOBILE JOURNAL.

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PRESSED STEEL FRAMES



These Top Frames are made of Cold Rolled Steel and are supplied, with or without Forgings, assembled or as Frame Members



Typical Pressed Steel Frame Member

We make a specialty of manufacturing to customers' specifications. Let us figure with you (in quantity) for:

FRONT AXLES—TUBULAR AND FORGED
REAR AXLES—CHAIN AND BEVEL GEAR DRIVE
(Ball, Roller, or Plain Bearings)
CHANGE GEARS TRANSMISSION GEARS
PRESSED STEEL AND MALLEABLE HUBS
ENGINE CRANKS MUFFLERS

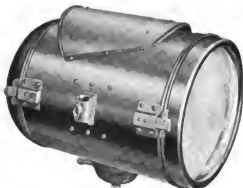
New York Show
Spaces 152, 153, 154, 155

Chicago Show
Spaces 132, 133, 134, 135

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FEDERAL MANUFACTURING COMPANY
Cleveland, Ohio

SELLING AGENT—HAYDEN EAMES—Cleveland.



Richmond Lamps

WILL PLEASE YOU

BECAUSE

they **MAKE A POWERFUL LIGHT**

and will **REMAIN LIGHTED**

during ordinary riding or endurance runs.

Richmond Lamps

please the most exacting Auto-mobile users.

They are built by hand of hardened brass, riveted throughout and guaranteed.

**RICHMOND IND.
MFG. CO.**

RICHMOND, IND.



Patent applied for.

COMET
BEST MICA
SPARK PLUGS.

NEW MICA FORMATION.

See "COMET" on every Plug.

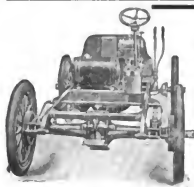
BEWARE CHEAP IMITATIONS.

Guaranteed to Give Perfect Satisfaction.

MANUFACTURED BY

OAKES & MORSE CO.

40 Rutbury Street, BOSTON, MASS.



THE **P**REMIER

A TOURING CAR REPRESENTING
QUALITY AND GUARANTEE OF
SATISFACTION.

PREMIER MOTOR MFG. CO.
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POPULAR EDITION AT \$2.00.

Homan's Automobile Educator.

606 pages, copious index, and about 900 illustrations. Attractively bound in "automobile red," with gold top and with gold lettering.

A comprehensive and authoritative handbook for Owners, Constructors, Operators, Repairmen, Etc. Intending Purchasers should consult this book before making their selection. Deals clearly and completely with the construction and successful operation of the various types of motor carriages driven by steam, gasoline and electricity. Postpaid to any address for \$2.

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Automobile Running Gears and Bodies,
SUITABLE FOR
Steam OR Gasoline Touring Cars.



WE BUILD ALL STYLES

Bevel Gear or Chain Drive, Radius Rods, Worm and Gear Steering Devices, Copper Hoods, Bodies.

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Successors to BRECHT AUTOMOBILE CO.,

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The William Cramp & Sons
S. & E. B. Co.
PHILADELPHIA, PA.

BRASS FOUNDRY.
Parsons' Manganese Bronze,
Parsons' White Brass. . . .

AUTOMOBILE Castings of all kinds, combining extreme lightness and great strength, a specialty.
PROMPT DELIVERIES GUARANTEED.

NOTICE!

Users, Agents, Importers, Dealers and Manufacturers of *Gasoline Automobiles*

United States Letters Patent No. 549,160, granted to George B. Selden, November 5, 1895, controls broadly all gasoline automobiles which are accepted as commercially practical. Licenses under this patent have been secured from the owners by the following named:

MANUFACTURERS:

ELECTRIC VEHICLE CO.
THE WINTON MOTOR CARRIAGE CO.
PACKARD MOTOR CAR CO.
OLDS MOTOR WORKS.
KNOX AUTOMOBILE CO.
THE HAYNES-APPERSON CO.
THE AUTO CAR CO.
THE GEORGE N. PIERCE CO.
APPERSON BROS. AUTOMOBILE CO.
SEARCHMONT AUTOMOBILE CO.
LOCOMOBILE CO. OF AMERICA.
THE PEERLESS MOTOR CAR CO.
U. S. LONG DISTANCE AUTO. CO.
WALTHAM MANUFACTURING CO.

POPE MOTOR CAR CO.
THE J. STEVENS ARMS & TOOL CO.
H. H. FRANKLIN MFG. CO.
CHARRON, GIRARDOT & VOIGT CO. OF AMERICA
(SMITH & MABLEY).
THE COMMERCIAL MOTOR CO.
BERG AUTOMOBILE CO.
CADILLAC AUTOMOBILE CO.
NORTHERN MFG. CO.
POPE-ROBINSON CO.
THE KIRK MFG. CO.
ELMORE MFG. CO.
E. R. THOMAS MOTOR CO.
BUFFALO GASOLENE MOTOR CO.
THE F. B. STEARNS CO.

IMPORTERS,

having licenses for the importation of all makes of foreign cars:

CHARRON, GIRARDOT & VOIGT CO. OF
AMERICA (SMITH & MABLEY).
CENTRAL AUTOMOBILE CO.

STANDARD AUTOMOBILE CO.
E. B. GALLAHER.

These manufacturers are pioneers in this industry and have commercialized the gasoline vehicle by many years of development and at great cost. They are the owners of upward of four hundred United States Patents—covering many of the most important improvements and details of manufacture. Both the basic Selden patent and all other patents owned as aforesaid will be enforced against all infringers.

No other manufacturers or importers than the above are authorized to make or sell gasoline automobiles; and any person making, selling or using such machines made or sold by any unlicensed manufacturer will be liable to prosecution for infringement.

A suit was commenced on October 29 against a dealer and against a manufacturer infringing United States Letters Patent No. 549,160.

A suit was commenced November 5 against a purchaser and user of an automobile infringing the same patent.

ASSOCIATION OF LICENSED AUTOMOBILE MANUFACTURERS

No. 7 EAST FORTY-SECOND STREET, NEW YORK

STEP By STEP

for
years
past
we have
improved
NATIONAL
ELECTRIC
VEHICLES

Ask for
our
Catalogue



MODEL No. 50

1904

1903

1902

1901

1900

NATIONAL MOTOR VEHICLE CO.

2200 EAST TWENTY-SECOND STREET,
INDIANAPOLIS, IND.

THE STUDEBAKER AUTOMOBILE.

ELECTRIC

(With Exide or Edison Battery)

Runabouts,
Stanhopes,
Surreys,
Victorias,
Delivery Wagons
and Trucks.

GASOLINE

Touring Car—
light and powerful.

"THE AUTOMOBILE WITH A REPUTATION BEHIND IT"

Write for Catalogue to

STUDEBAKER BROS. MFG. CO.

(Automobile Dept.), SOUTH BEND, IND.

Studebaker Bros. Co. of New York, Broadway and 40th St., New York City.
Studebaker Bros. Mfg. Co., 378-388 Wabash Ave., Chicago, Ill.
Studebaker Bros. Mfg. Co., cor. 16th and Blake Sts., Denver, Col.
Branch Houses and Agencies in other principal cities.

TELEGRAM

LOS ANGELES, Cal., November 21, 1903.

J. STEVENS ARMS & TOOL CO.,
Chicopee Falls, Mass.:

Won Five Mile Race in seven forty-three—ten thousand
people.

(Signed) NORMAN W. CHURCH.

OUR GASOLINE MACHINE IS THE

"CAR THAT DOES THINGS."

Price at Factory,
\$1,300

SEND FOR ILLUSTRATED CATALOG, CONTAINING
DETAILED DESCRIPTION.

J. STEVENS ARMS & TOOL CO.

695 Main Street,

CHICOPEE FALLS, MASS.

Member Association of Licensed Automobile Manufacturers.



Miss SUSANNA COCROFT, a prominent instructor in physical culture
operating a

HAYNES-APPERSON RUNABOUT

in Lincoln Park, Chicago.

PRICE \$1,250, COMPLETE.

Our catalogue gives full information. Inquirers are
urged to visit our factory, where every detail of HAYNES-
APPERSON superiority can be seen and fully understood.

See our Exhibit at the New York Show, January 14-24;
Chicago Show, February 4-14.

HAYNES-APPERSON CO., Kokomo, Ind., U. S. A.

The Oldest Makers of Motor Cars in America.

Member of the Association of Licensed Automobile Manufacturers.

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Eastern Representatives: BROOKLYN AUTOMOBILE CO., 128-41-43 Fulton
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MAXWELL, Oneida, N. Y., Agent for Central New York.

NATIONAL AUTOMOBILE & MFG. CO., Pacific Coast Agents, San Francisco.

Specially Elastic Fabric Construction

—PREVENTS—

BLISTERING, CRACKING,
SEPARATION OF FABRIC LAYERS,
SEPARATION OF FABRIC AND COVER.

Produces an Exceptionally Lively Action.



The construction of the MORGAN & WRIGHT CLINCHER throughout is indisputable evidence of the advantage of long experience in tire manufacturing.

ADDED VALUE WITHOUT ADDED COST.

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CHICAGO.

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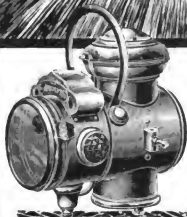
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1067 Mission Street.

SPACE 5 NEW YORK SHOW.

AUTOLYTE GAS LAMPS

1904

MOTOR



No. 23. Price \$20.00.

Diam. 8 1/2 in. Depth 10 1/2 in. Height 13 in.

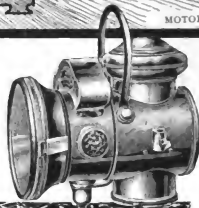


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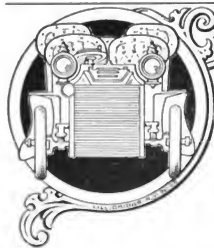
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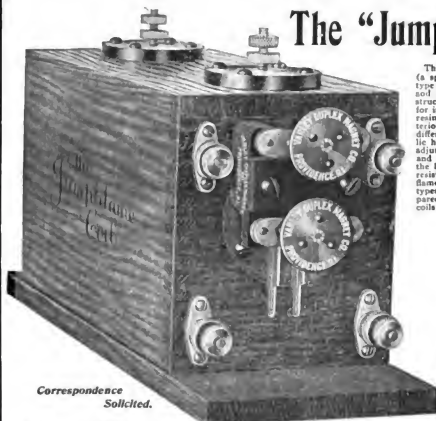
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Want, For Sale and similar advertisements only inserted under this heading at the rate of 10 cents a line of about seven words. Copy for this department should be in our hands not later than the Monday morning preceding the issue for which it is intended. Nothing less than two lines accepted. Advertisements addressed to **HORSELESS AGE** will be forwarded if postage is enclosed.

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NEW MODEL 1904 Knox Runabout, \$1,200; best reasons for selling. L. M. F., Horseless Age.

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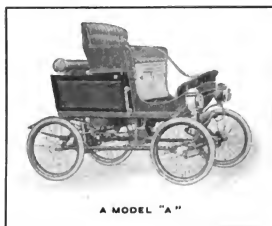
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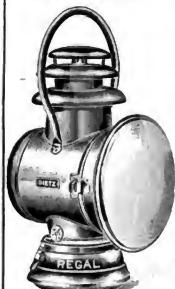
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